

IN INDUSTRY • IN TRANSPORTATION • ON THE SEA • IN THE AIR

DIESEL AND GAS & TURBINE PROGRESS



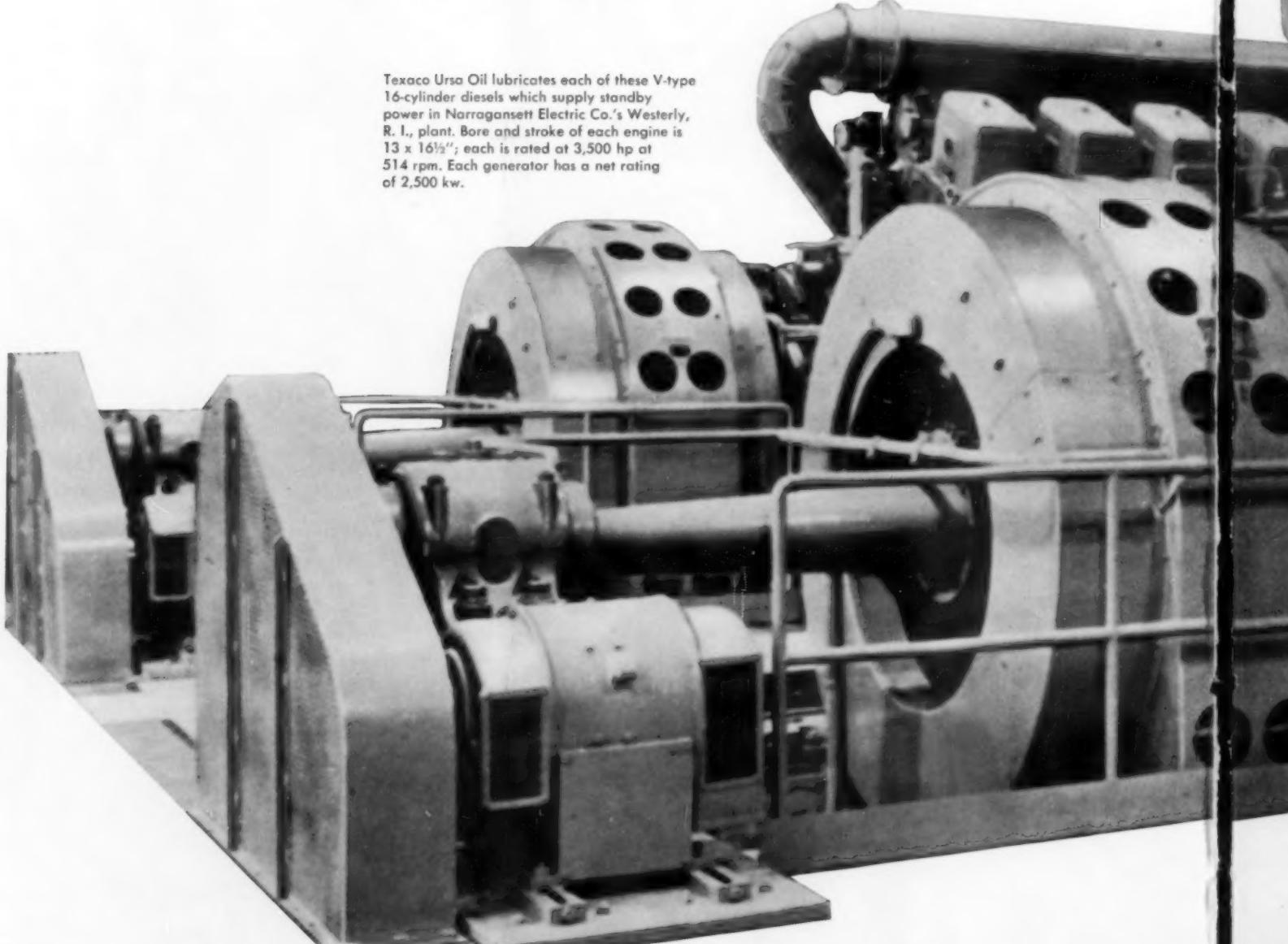
FIVE DOLLARS PER YEAR

AUGUST, 1958

FIFTY CENTS PER COPY

Texaco URSA OIL protects Narragansett's reserve power

Texaco Ursa Oil lubricates each of these V-type 16-cylinder diesels which supply standby power in Narragansett Electric Co.'s Westerly, R. I., plant. Bore and stroke of each engine is 13 x 16½"; each is rated at 3,500 hp at 514 rpm. Each generator has a net rating of 2,500 kw.



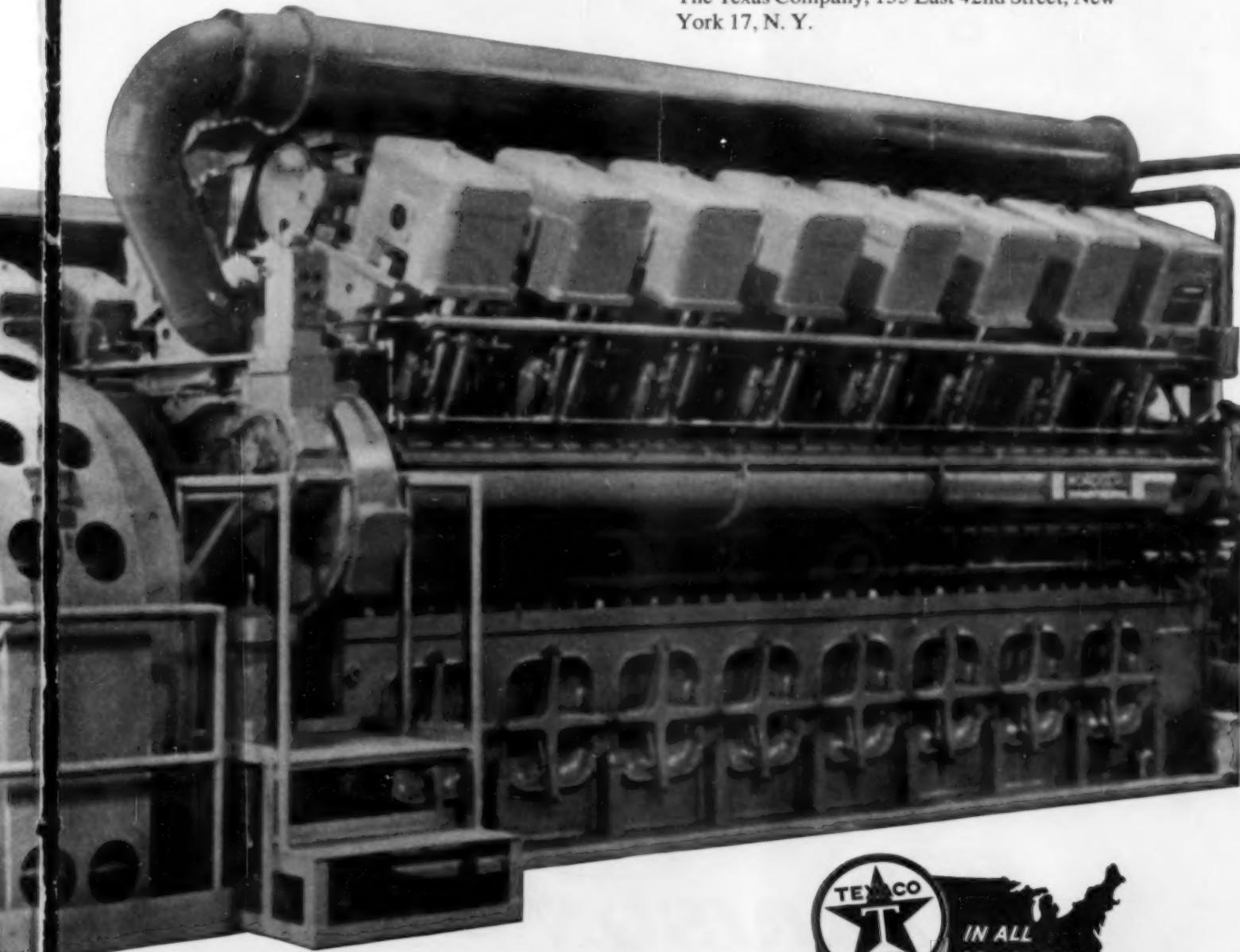
Narragansett Electric Company uses these two Supairthermal V-16 diesels for standby power. It's essential that these engines be instantly available, even after long periods of idleness. That's why Narragansett uses Texaco Ursa Oil to protect engine power, keep it reliable and ready—anytime.

With Texaco Ursa Oil in the crankcases, Narragansett engineers are certain of getting full rated horsepower because Texaco Ursa Oil keeps rings free and prevents the formation of harmful deposits. And because Texaco Ursa Oil is a premium quality lubricant, it protects against wear,

minimizes operating and maintenance costs.

There is a complete line of Texaco Ursa Oils refined and processed especially for the lubrication of diesel, gas and dual-fuel engines. In fact, *for over twenty years, more stationary diesel horsepower in the United States has been lubricated with Texaco than with any other brand.*

Your Texaco Lubrication Engineer offers his years of experience to help you select the right Texaco lubricant for your needs. You can contact him by calling the nearest of the more than 2,000 Texaco Distributing Plants, or by writing The Texas Company, 135 East 42nd Street, New York 17, N. Y.



LUBRICATION IS A MAJOR FACTOR IN COST CONTROL
(parts, inventory, production, downtime, maintenance)

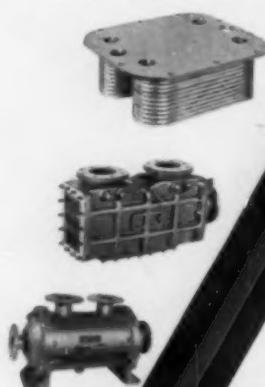




Temperatures made to order for all types of diesel engines. Harrison heat exchangers are rugged, reliable and compact... engineered and built to General Motors standards of quality.

**Vessel Weathers Grueling
Nine-Month Fishing Season
With Harrison-Cooled GM Diesel!**

The Raider's rugged voyage reaches from the icy waters of Alaska to the sun-drenched regions off San Diego! And Harrison heat exchangers keep engine oil temperatures shipshape for this long haul. Harrison heat transfer equipment provides the optimum in cooling efficiency and economy even under the heaviest loads and continuous operating assignments. That's why you'll find Harrison regulating temperatures in every line of industry and defense. If you have a cooling problem, look to Harrison—with over 47 years' experience in the manufacture of top-quality heat-control products.



HARRISON RADIATOR DIVISION • GENERAL MOTORS CORPORATION • LOCKPORT, N.Y.

DIESEL and GAS TURBINE PROGRESS

REX W. WADMAN *Editor and Publisher*

MEMBER OF



Business Publications Audit
of Circulation, Inc.

IN INDUSTRY • IN TRANSPORTATION • ON THE SEA • IN THE AIR

BRUCE W. WADMAN	<i>Executive Vice Pres.</i>
ROBERT E. SCHULZ	<i>Managing Editor</i>
JAMES W. BROWN	<i>Midwest Editor</i>
F. HAL HIGGINS	<i>Western Field Editor</i>
PEGGY R. TOMACK	<i>Production Manager</i>
RUTH R. REINER	<i>Circulation Dept.</i>

MEMBER OF



Verified Audit Circulation
Company

DIESEL PROGRESS for August, 1958, Vol. XXIV, No. 8. Published Monthly by Diesel Engines, Inc., 816 N. La Cienega Blvd., Los Angeles 46, California. Phone OLeander 3-7410. Subscription rates are \$5.00 for U.S.A. and possessions. All other countries \$7.50 per year. Subscriptions may be paid the London Office at £2-12s-6d per year. Accepted as Controlled Circulation Publication at Long Prairie, Minnesota.

DIESEL PROGRESS is indexed regularly by Engineering Index, Inc. and is available in microfilm editions from University Microfilms, Inc., Ann Arbor, Michigan.

MEMBER OF



Magazine Publishers
Association, Inc.



FRONT COVER ILLUSTRATION

Interior of powerhouse at Chute des Passes, a power development project of the Aluminum Co. of Canada. Twelve General Motors (Electro-Motive) diesel-electric generating units are shown.

EXECUTIVE OFFICES

816 N. La Cienega Blvd.
Los Angeles 46, Calif.

EDITORIAL OFFICES

1701 W. Wisconsin Ave.
Milwaukee 3, Wisc.

BUSINESS OFFICES

MILWAUKEE 3:
Bruce W. Wadman
1701 W. Wisconsin Ave.
Division 4-5335

LONDON E.C. 4:
G. L. Fetherstonhaugh
St. Paul's Corner
Ludgate Hill

NEW YORK 17:
Jack Bain Company
545 Fifth Ave.
Murray Hill 2-3345

HIALEAH, FLA.:
Edwin Dennis
250 W. 50th St.
TUXedo 8-2188

LOS ANGELES 46:
James Joseph
8421 Melrose Ave.
Olive 3-4542

HOUSTON, TEXAS:
Michael T. Pate
1948 Lexington
JACKSON 2-9088

PORT LAVACA, TEXAS:
Ruel McDaniel
P. O. Drawer 45

JEFFERSON CITY, MO.:
L. H. Houck
400 Linden Dr.
Phone: 6-2993

NORTHWOOD, MIDDX, ENGLAND:
B. W. Lansdowne
"Oaklands," Nicholas Way

DETROIT 39, MICH.:
James W. Brown
15936 Kinloch Road
KENwood 2-1543

EVANSVILLE, IND.:
A. D. Burroughs
605 W. Maryland St.
Harrison 3-7313

Specialization

**FLUID FLOW & VIBRATION
DAMPING PRODUCTS**

SCHWITZER
CORPORATION
INDIANAPOLIS, INDIANA

TURBOCHARGERS FAN DRIVES WATER PUMPS
SUPERCHARGERS ACCESSORY DRIVES OIL PUMPS
FAN BLADES VIBRATION DAMPERS SHAFT SEALS
AIR STARTING MOTORS



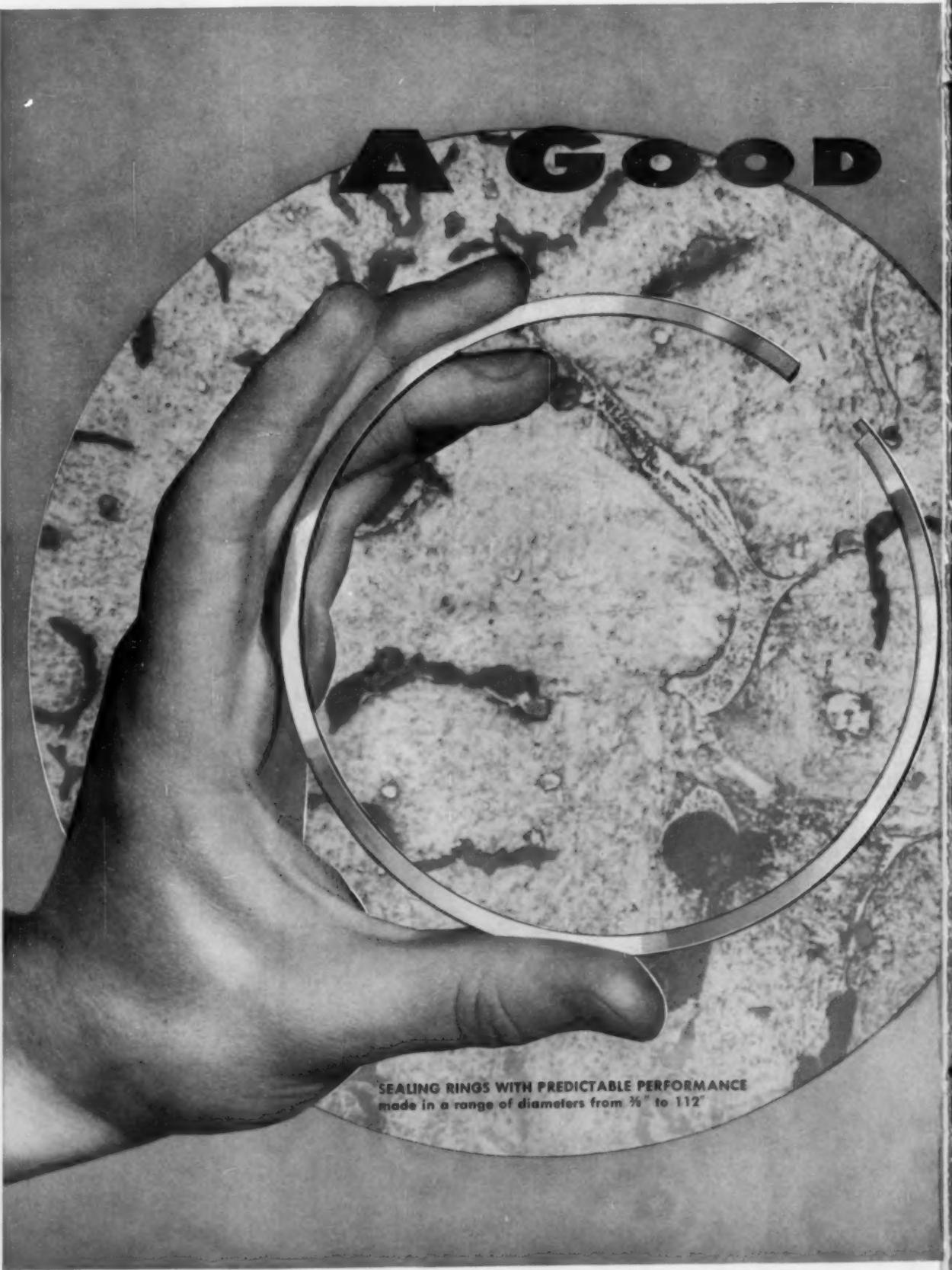
MERCEDES-BENZ DIESEL ENGINES

...Applications Unlimited!

Both manufacturers and users alike have long been favorably impressed by the impact of the name Mercedes-Benz . . . Today, these diesel engines can be more than a name — they can power virtually any piece of construction equipment . . . High horsepower to low weight, easier cold weather starts, extreme economy, downtime cut to the bone — just a few reasons why Mercedes-Benz is the answer to greater efficiency!



UTICA DIVISION
CURTISS-WRIGHT 
CORPORATION • UTICA MICHIGAN



GRASP

**Koppers knows the importance of proper material selection
in producing reliable piston ring and seal performance**

Predictable sealing performance results when Koppers matches its knowledge of materials performance to your operational requirements. Koppers pioneering in static and centrifugal casting of iron and alloys . . . as well as its recent leadership in the use of plastics in rings . . . results in a background of applications that cannot be equaled.

Koppers piston rings, sealing rings and seals have been selected as standard equipment in hydraulic actuators, butterfly valves, bearings, transmission controls, fuel pumps, hot air valves and fuel injectors. Koppers can solve your sealing problems. Write us stating your problem today.
**KOPPERS COMPANY, INC., 1408 Hamburg Street,
Baltimore 3, Maryland.**



PISTON AND SEALING RINGS

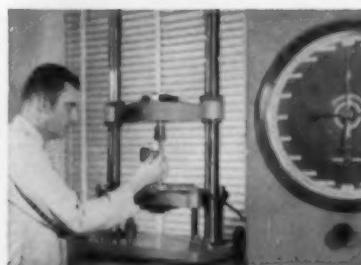
Engineered Products Sold with Service



Fluid Dynamics Knowledge gained by Koppers through many years of experience helps solve the most complicated problems involving the control of gases under pressure.



Face Design Knowledge gives Koppers the ability to produce rings and seals that give reliable and economical performance under the most demanding operating conditions.



Materials Knowledge enables Koppers to select the proper material or combination of metals, plastics or ceramics to insure maximum efficiency and length of service.

What made Thief River Falls decide on STANDARD D&G Oil



*Two Fairbanks-Morse OP engines
turn in top-rated
performances
with this
lubricant.*



The situation: In January of 1952 the Thief River Falls, Minnesota, municipal light plant put into service a 10-cylinder, 1,600 hp. Fairbanks-Morse opposed piston engine. In November, 1955, a 1,900 hp. Fairbanks-Morse OP engine was added.

What was done: The power plant management discussed lubrication requirements with Standard Oil lubrication specialists. Because of the evidence that STANDARD D&G Oil, with its higher additive level, could (1) reduce ring and wall wear, (2) reduce ring sticking, (3) increase bearing life and (4) reduce engine deposits, this oil was selected for the first engine installed. After 22,000 hours, inspection showed little or no wear. Small wonder then that when the second OP engine was put into service in 1955, STANDARD D&G Oil was again selected. After 7,500 hours, similar performance is being obtained on the newer engine.

Technical service performed by Standard Oil men pays off for the power plant management. Standard men take frequent samples for field inspection of oil condition. Other samples are regularly taken for transmittal to Standard's Whiting, Indiana, laboratory for complete analysis.

What you can do: Get more facts about STANDARD D&G Oil from the Standard Oil lubrication specialist near you in any of the 15 Midwest and Rocky Mountain states. Or write **Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.**

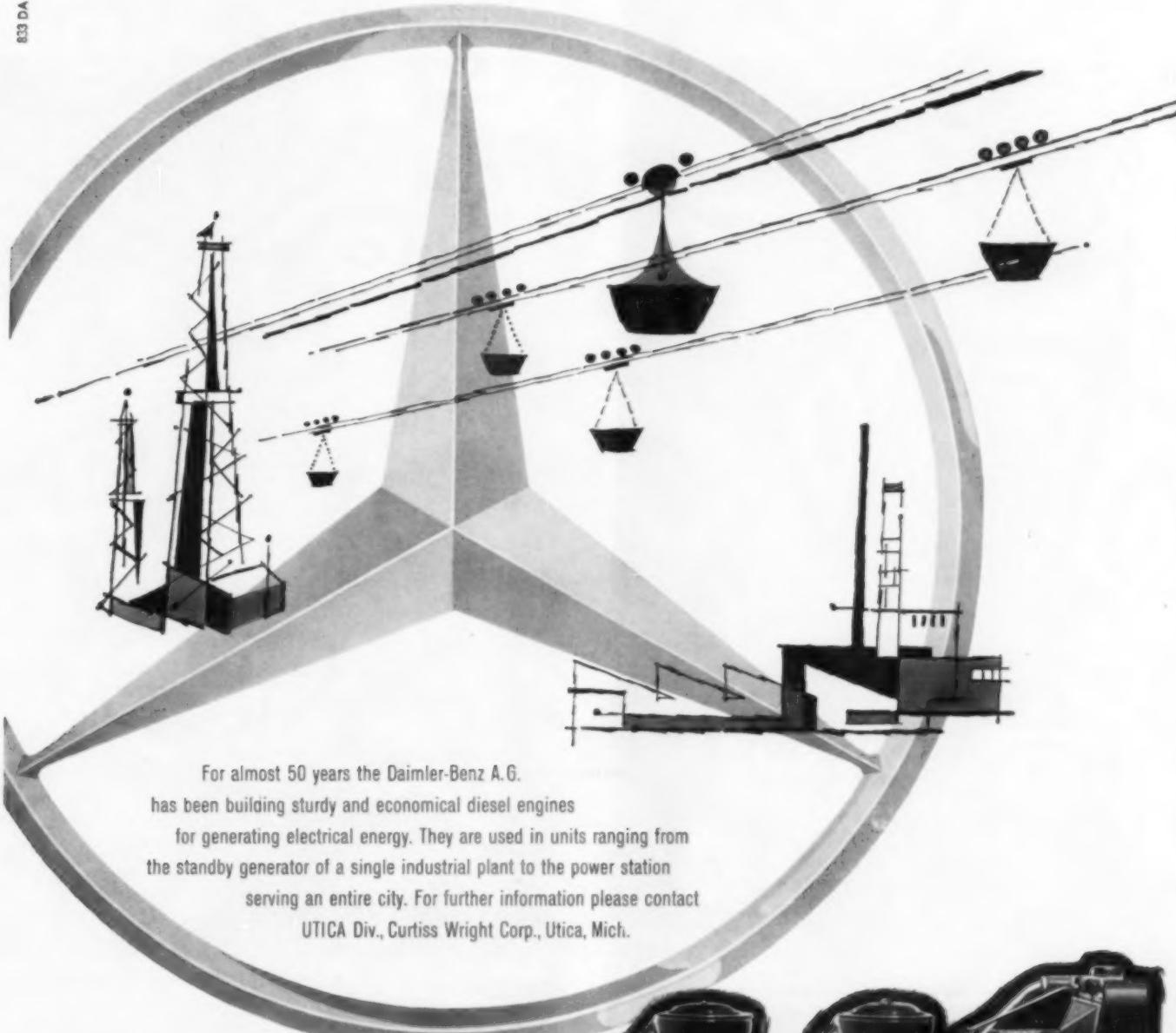
Quick facts about STANDARD D&G Oil

- Made from highest-quality solvent-refined stock.
- Contains additives which impart superior detergent-dispersant and anticorrosion properties.
- Antifoaming.
- Oxidation-resistant.
- Recommended for use (1) with economy fuels (2) in extreme-load and/or low-temperature service.

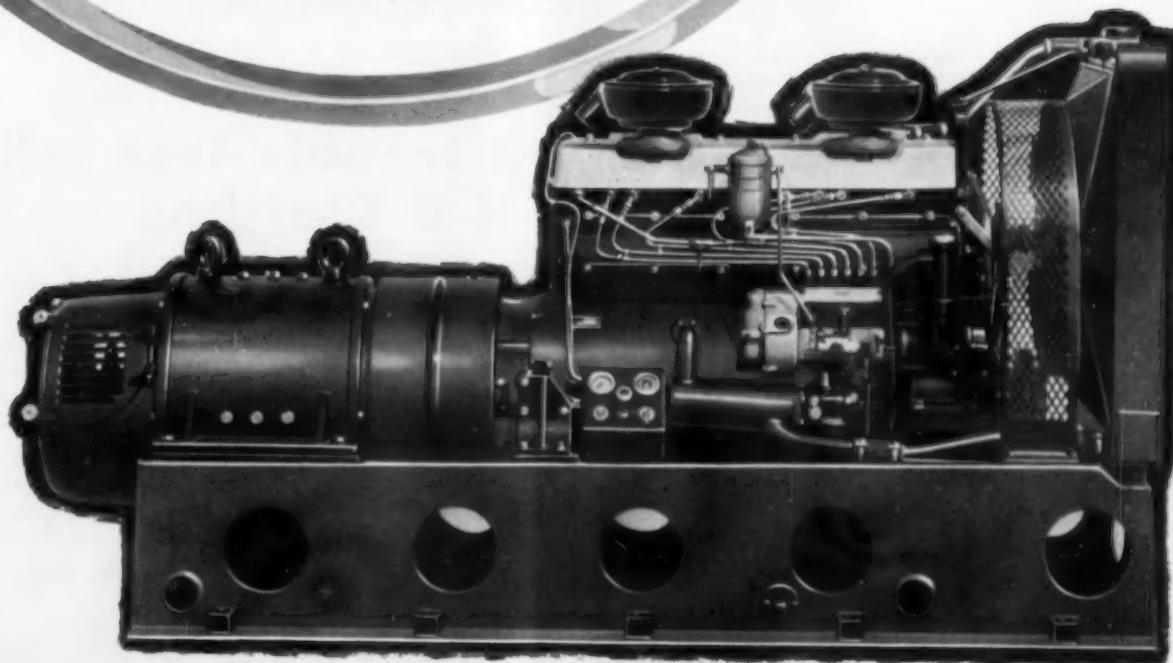
You expect more from **STANDARD** and get it!



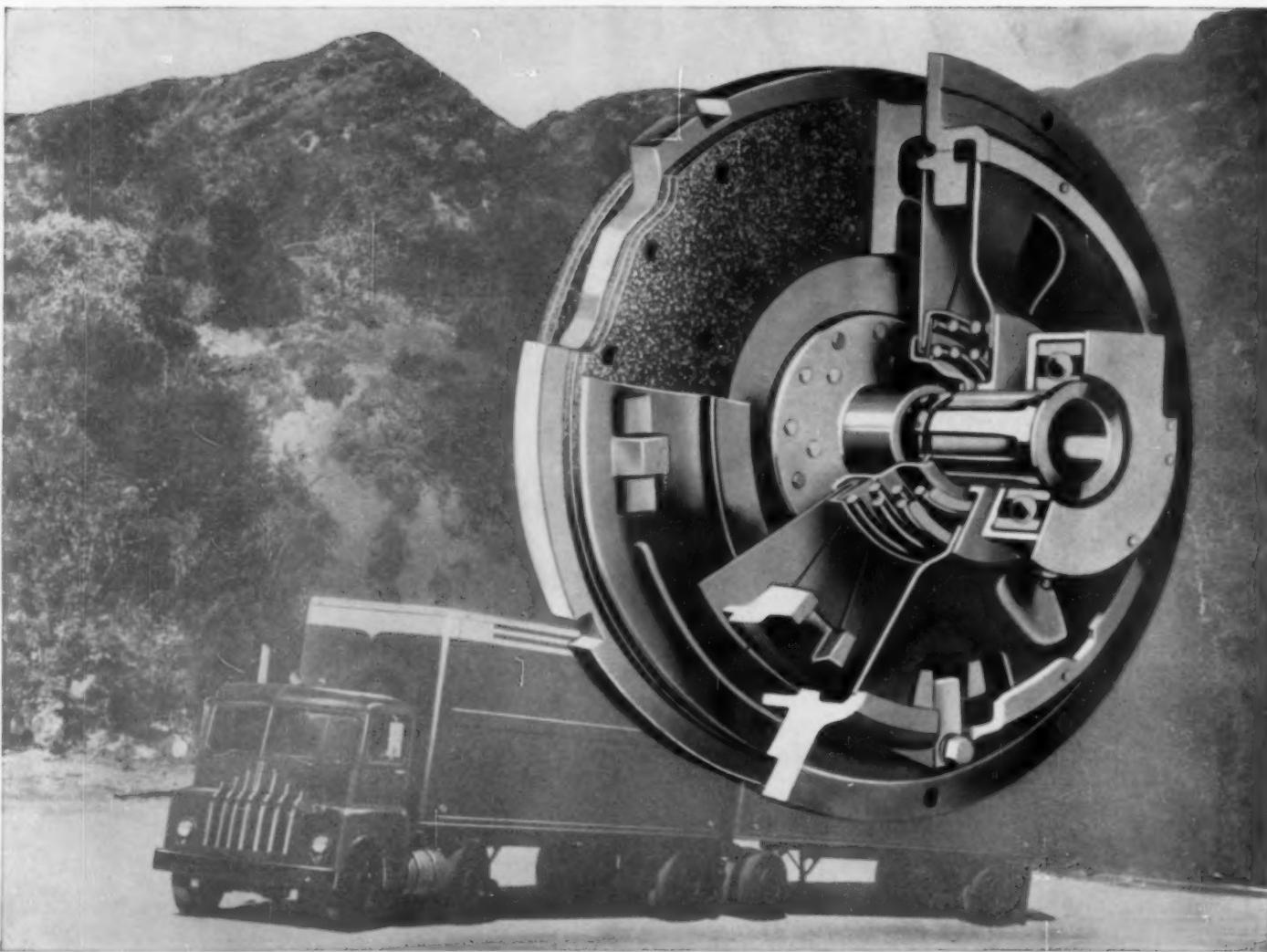
Taking a look at the record. Morris L. Owen, plant superintendent (left), and Standard Oil's Carl Kienner look at performance data on the two Fairbanks-Morse OP engines. Carl is a good one to talk things over with. He has been doing this sort of work for 10 years with Standard. Before that he received an engineering degree at the Michigan College of Mining and Technology and completed the Standard Oil Sales Engineering School.



For almost 50 years the Daimler-Benz A.G.
has been building sturdy and economical diesel engines
for generating electrical energy. They are used in units ranging from
the standby generator of a single industrial plant to the power station
serving an entire city. For further information please contact
UTICA Div., Curtiss Wright Corp., Utica, Mich.



M E R C E D E S - B E N Z



Western Fleets Report:

150,000 to 200,000 trouble-free miles from Spicer H-D Clutches

Western terrain means rugged service for clutches. Yet, one West Coast operator says, "The only time we touch the Spicer Clutch is at the end of 200,000 miles. Then, we rebuild the engine and overhaul the clutch — whether it needs it or not."

Still another fleet owner states, "We don't even bother with preventive maintenance for our Spicer Clutches. They're absolutely trouble-free from one

overhaul period to another — or about 150,000 miles."

Make sure your clutches last at least as long as the engine by installing Spicer Heavy-Duty Clutches. They're available in a unitized assembly . . . including release bearing, bearing housing and yoke. Specify Spicer on your next job.

For further information or technical assistance contact the Dana Engineer.

DANA CORPORATION • Toledo 1, Ohio

DANA PRODUCTS Serve Many Fields:

AUTOMOTIVE: Transmissions, Universal Joints, Propeller Shafts, Axles, Powr-Lok Differentials, Torque Converters, Gear Boxes, Power Take-Offs, Power Take-Off Joints, Clutches, Frames, forgings, stampings.

INDUSTRIAL VEHICLES AND EQUIPMENT: Transmissions, Universal Joints, Propeller Shafts, Axles, Gear Boxes, Clutches, forgings, stampings.

AVIATION: Universal Joints, Propeller Shafts, Axles, Gears, forgings, stampings.

Many of these products manufactured in Canada by Hayes Steel Products Limited, Merrittton, Ontario.





BENDIX FUEL INJECTION EQUIPMENT AIDS OPERATION AT ONE OF CANADA'S LARGEST URANIUM MINES!

The Gunnar Mines, Limited, uranium ore mining operation in Northwestern Saskatchewan is one of the largest producers of uranium in Canada. And to process the uranium ore at Gunnar, diesel power is supplied by Nordberg Supairthermal Diesel engines equipped with Bendix* Fuel Injection Equipment.

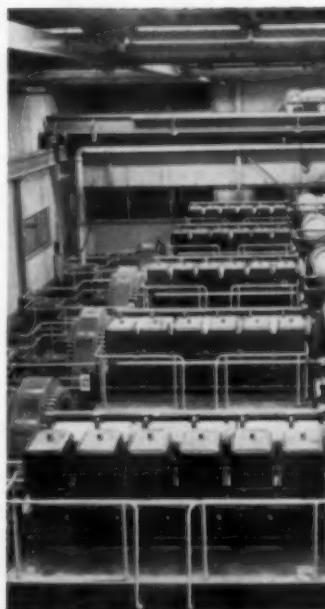
Operating only 45° miles south of the Arctic Circle, the diesel equipment must operate efficiently in temperatures that reach -55°F. Since the area does not lend itself to hydroelectric generation of power, Gunnar chose a diesel-electric type power plant. The Nordberg Diesels, each rated 1200 hp at 450 rpm, are directly connected to the generators.

This strategically valuable uranium deposit utilizes its diesel-electric power plant to the fullest. Diesel engines equipped with Bendix Fuel Injection Equipment aid in furnishing the elec-

tric power for the mine, mill, and town facilities.

Only the best of diesel equipment and diesel engine components such as Bendix Fuel Injection Equipment were selected for this vital work. For, only the best will do when the demands are great on diesel engines—for all types of industry. And Bendix Fuel Injection Equipment meets the highest standards for exceptional performance. *REG. U.S. PAT. OFF.

SCINTILLA DIVISION OF
BENDIX AVIATION CORPORATION, SIDNEY, N. Y.
Export Sales and Service: Bendix International Division,
205 East 42nd St., New York 17, N. Y.



1200 HP Nordberg Diesel generator sets supply 5070 kw.

Scintilla Division
SIDNEY, N. Y.





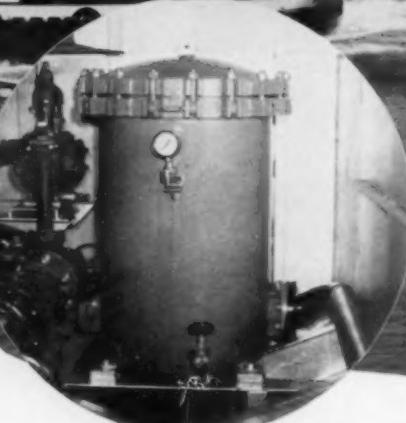
New Twin Tugs 100% equipped with NUGENT FILTERS

The **CAROL FOSS** and the **SHANNON FOSS** are new twin tugs owned by The Foss Launch and Tug Company, Seattle, Washington. Each is powered by a 1400 HP Nordberg Diesel Engine.

To assure these engines long years of trouble-free, efficient filtration of lube and fuel oil, The Foss Company specified Nugent Series 1555 Laminated Fiber Disc Filters . . . 100%.

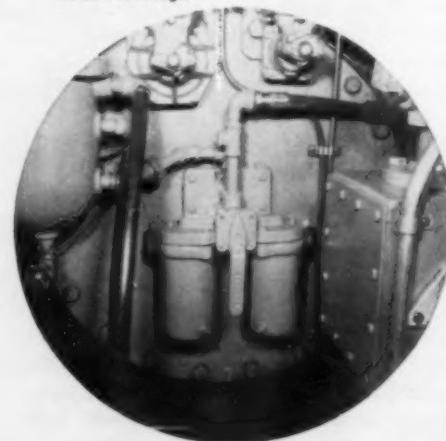
Each tug is equipped with a Nugent 1555-4L12 which filters all the lube oil in circulation every cycle before it flows to the bearings. Foreign solids as small as 2 or 3 microns are removed and oil is filtered at the rate of 290 GPM. The filter contains twelve 4L cartridges having a combined filtering surface of 37,200 square inches. Supercharger lube oil is handled by a Nugent 1555-1R duplex filter with switching valve, which allows oil to pass through either filter or both in parallel. Fuel Oil is also filtered by a Nugent Laminated Disc Filter equipped with a switching valve. Capacity of each filter comprising this duplex is 7 GPM of 35 SSU viscosity fuel oil at 3 psi pressure drop.

Filtering plays a major role in the efficient operation of an engine. If you want the best protection available, it will pay you to talk to Nugent. Top quality filters have been our business for over 60 years.



A Nugent 1555-4L12 Laminated Disc Lube Oil Filter is installed on the Nordberg Diesels powering the **CAROL FOSS** and the **SHANNON FOSS**.

Nugent 1555 Duplex: Filters handle both the supercharger lube oil and the fuel oil aboard the new Foss tugs.



WRITE FOR BULLETIN 7C

This new bulletin illustrates and describes Nugent Laminated Fiber Disc Filters. Complete information on design, construction, specifications and capacities of standard, high pressure and duplex models.



REPRESENTATIVES IN
PRINCIPAL CITIES

W.M. W. NUGENT & CO., INC.
3441 CLEVELAND STREET, SKOKIE, ILLINOIS

OIL FILTERS • STRAINERS • TELESCOPIC OILERS
OILING AND FILTERING SYSTEMS • OILING DEVICES
SIGHT FEED VALVES • FLOW INDICATORS

Gas Turbine Power Creates New Era *for* Commercial Boats

*Astonishing starts, spectacular speed, startling lightness
with revolutionary Solar turbines*

NEW
HIGGINS
BOAT



Two V-drive Solar Jupiter® turbines produce 1000 hp in this aluminum-hulled 52 ft work boat. Dry weight is 31,000 lbs. It will carry 25 passengers and crew at speeds better than 40 mph.

NEW
SEWART
BOAT



Sewart's new 55 ft work boat is powered by two conventional-drive 500 hp Jupiter engines. Steel hull is designed for open sea operation at speeds up to 35 mph. Dry weight: 41,000 lbs. Capacity: 50 plus crew.

Proven-in-service Solar gas turbines bring a profitable new look to marine propulsion. Small in size, light in weight, these powerful new power plants offer unique advantages over conventional marine engines. They start instantly, take full load without laboring, operate efficiently on almost any type of fuel. And boats powered by husky, vibration-free Solar turbines show vastly increased speeds —with substantial savings on maintenance.

Dependable, high-performance commercial boats powered by Solar turbines are in the water now! For detailed information on how Solar turbines can step up your commercial boat operation, write to Dept. F-54, Solar Aircraft Company.

SOLAR 
AIRCRAFT COMPANY

SAN DIEGO
DES MOINES

2200 PACIFIC HIGHWAY, SAN DIEGO 12, CALIFORNIA



THIS MUCH DIRT CAN RUIN A DIESEL ENGINE



THIS PUROLATOR FILTER



STOPPED THIS MUCH DIRT

Diesels can't escape abrasive dirt . . . and it takes about 8 ounces of it to ruin an engine.

The 18 pounds of dirt shown above were stopped by a Purolator heavy duty dry type air filter on a rock drilling rig in 940 hours of operation—with no servicing of the filter required. The 6 cylinder, 2 cycle engine and the 750 CFM compressor used on the job were fully

protected through the toughest operating conditions. 18 pounds of dirt were stopped . . . none got through the filter.

There's a Purolator dry type air filter designed to meet the specific requirements of your operation. Write today for full information. If you have a particularly tough problem, describe it . . . Purolator has the solution.

Filtration For Every Known Fluid

PUROLATOR
PRODUCTS, INC.

RAHWAY, NEW JERSEY AND TORONTO, ONTARIO, CANADA

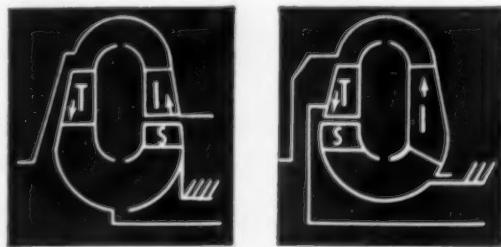
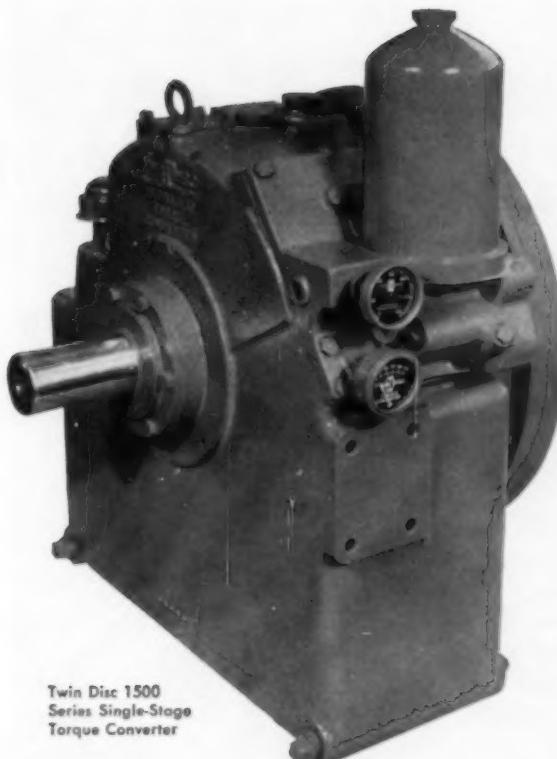


FIG. 1

Schematic drawings of the two types of single-stage circuits. The Type 1 (outflow) circuit is at left. Type 6 (inflow) is at right.

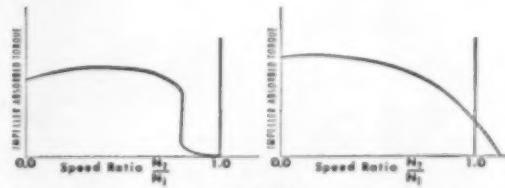


FIG. 2

A comparison of the torque characteristics of the Type 1 circuit (left) and the Type 6 circuit. The Type 1 circuit unloads the engine quite abruptly at a speed ratio of about .825. The Type 6 design allows a no-load speed ratio of 1.15:1.

Match the converter to the machine ...not the machine to the converter!

Twin Disc offers its customers the choice of two different circuit designs in each series of single-stage torque converters. The two circuit designs fit within the same housings since the circuits have the same basic dimensions. Each circuit has, however, distinctly different performance curves enabling machine designers to:

*Match the converter to the machine
NOT
the machine to the converter*

Figure 1, above, shows schematic sketches of each circuit. Both have the identical pear-shape convolution, the principal apparent difference being

that the position of the stator is shifted. This shift causes considerable difference in the absorbed torque of the impeller.

The Type 1 design "unloads" the engine quite abruptly at a speed ratio of approximately .825. In effect, the converter becomes its own output shaft governor. Since the circuit absorbs almost no power at 1:1 speed ratio, a lock-up clutch between the turbine and pump may be incorporated in the mechanical design.

Where applications require a broader speed range in converter drive, the Type 6 circuit is recommended. As shown in Figure 2, this

design allows a no-load speed ratio of 1.15:1. Torque absorption at stall is also higher, which results in higher stall torque up to 3.5:1.

For further information as to how these circuits can be adapted to your particular design, write or call Twin Disc Clutch Company.



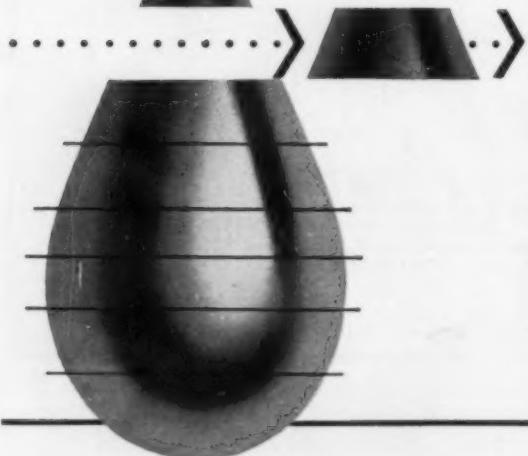
TWIN DISC
Torque Converters

TWIN DISC CLUTCH COMPANY, Racine, Wisconsin (Hydraulic Division) Rockford, Illinois

ENGINEERING

NEWS YOU CAN USE ABOUT ENGINE AND COMPRESSOR PERFORMANCE

WOULD YOU BELIEVE THAT ONE DROP OF OIL COULD BE THIS IMPORTANT?



Take a 12 cylinder, 2,000 HP, 330 RPM engine...let just **ONE-EIGHTH OF A DROP** of additional oil per stroke be used in each cylinder and here's what will happen: your oil consumption rate will increase from 8000 BHP hours per gallon to 2000!

And that's the big reason Cook rings save you money. Like other oil control rings, Cook rings meter oil and properly spread it, but Cook rings do this in addition: *they prevent excessive use of oil!*

Don't just get oil wiper rings...get Cook *engineered* conformable oil wiper rings, the most copied oil control rings in the world!

KEEPS PACKING COOL ...AND IT'S LEAK-PROOF!



Cook's new leak-proof packing cup features circulating water completely *inside of the cup itself*... eliminates any possibility of leakage, corrosion or contamination of the material under compression. These are big advantages for all applications—and are naturally of even greater importance on non-lubricated service.

PISTON RING WEAR LOG SHEET AVAILABLE FREE

Here's the perfect record for cylinder liner and piston ring wear in your engines. Properly kept, this log will give you the "history" of your engine at a glance. Copies are available from C. Lee Cook Company without cost or obligation. Try them, request a dozen on your letterhead! Write C. Lee Cook Company, 940 South 8th Street, Louisville 3, Kentucky.



**C. LEE
COOK** 
COMPANY

Division of Dover Corporation

Rings and Packings Since 1888

ENGINEER'S FIELD REPORT

PRODUCT RPM DELO OIL

Silva & Hill Construction Co.
FIRM Los Angeles, Calif.

5,000 hours at 2,000 rpm before overhaul



Working at 2,000 rpm speeds in heavy dust, Silva & Hill Construction Co. operates 8 Caterpillar DW-21s (like one above) five days a week removing 3,500,000 cu. yds. of dirt and rock for Burbank golf course. Firm reports RPM DELO OIL keeps these units rolling an average of 5,000 hours before

major overhaul. Says Maint. Supt. H. C. Basinger: "We've got 39 diesel-powered machines working to beat a one-year deadline. Any unexpected delay costs plenty. That's why we stick with 'DELO'. It's proved it will keep equipment rolling longer without engine breakdowns or repairs."



Lubricated with RPM DELO OIL, this Caterpillar D-8 Tractor (left) turned in 10,000 hours, bulldozing and pulling sheepfoot rollers, before major overhaul. Frank W. Hill (right) Silva & Hill partner, reports: "We've used RPM DELO OIL in all our diesel units since 1940. It has really paid off in keeping our equipment in top running condition."



TRADEMARKS "RPM DELO" AND CHEVRON DESIGN REG. U.S. PAT. OFF.

STANDARD OIL COMPANY OF CALIFORNIA, San Francisco 20
THE CALIFORNIA OIL COMPANY, Perth Amboy, New Jersey

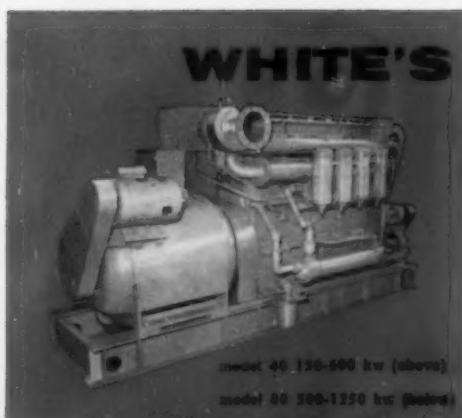
Why RPM DELO Oils reduce wear—prolong engine life

- Oil stays on engine parts—hot or cold, running or idle
- Anti-oxidant resists lacquer formation
- Detergent keeps parts clean
- Special compounds prevent corrosion of bearing metals
- Inhibitor resists crankcase foaming.



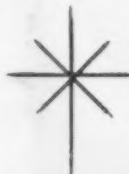
For More Information or the name of your nearest distributor, write or call any of the companies below.

STANDARD OIL COMPANY OF TEXAS, El Paso
THE CALIFORNIA COMPANY, Denver 1, Colorado

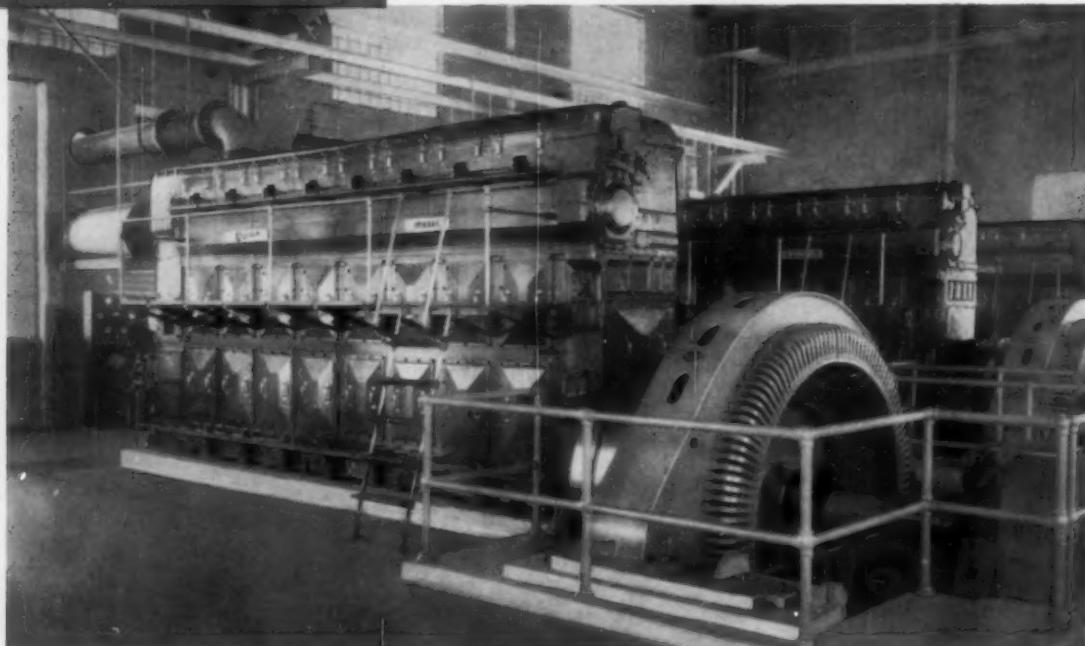


Superior Engines . . .

**give you all the proven
benefits of simple design**



*Easy Operation
Efficiency
Economy
Dependability
Long Life*



Extreme design simplicity distinguishes White's Superior engines. Relatively few cylinders and internal parts provide power equal to other engines having more cylinders and more complex construction. Such simplicity gives you many benefits. Superiors are *easier to start and operate*. The open chamber design achieves *efficient combustion* under all speeds and loads, giving *economical operation on non-premium fuels*. Fewer moving parts mean *fewer replacements and longer life*. Cylinder block design allows *easy accessibility to internal parts* for quick inspection and servicing. Hundreds of satisfied customers throughout the world repeatedly specify Superior Diesels for prime power, supplementary or standby power. Superior's simplified design proves its worth daily on municipal, public utility, construction,

marine, oil field, and general industrial applications. Diesel, dual-fuel, and gas engines are available in the range from 225 to 2150 H.P.; portable or stationary generator sets from 150 to 1500 KW.

TYPICAL INSTALLATIONS

WOODSFIELD, OHIO: 1250 KW Model 80 dual fuel engine generator set.

ALBUQUERQUE, N. MEXICO: 250 KW Model 6G-825 gas engine generator set.

GRAETTINGER, IOWA: 500 KW Model 60 diesel engine generator set.

MILFORD, IOWA: 645 KW Model 60 dual fuel engine generator set.

WRITE TODAY FOR COMPLETE INFORMATION . . .



White Diesel

WHITE DIESEL ENGINE DIVISION
The White Motor Co. Plant and General Offices: Springfield, Ohio

SALES AND SERVICE POINTS: Ketchikan, Alaska; San Francisco, Terminal Island, Calif.; Denver, Colo.; Washington, D.C.; Clearwater, Fla.; Chicago, Ill.; Wichita, Kan.; New Orleans, La.; Boston, Mass.; Baltimore, Md.; Park Rapids, Minn.; Webster Groves, Mo.; Callaway, Neb.; New York, N.Y.; Tulsa, Okla.; Portland, Astoria, Ore.; Hickory, Pa.; Ft. Worth, Houston, Texas; Seattle, Wash.; Calgary, Alberta; Vancouver, B.C.; Halifax, N.S.



Geared by FULLER . . .

For heavy-duty earthmoving and mining equipment, leading manufacturers standardize on Fuller Transmissions . . . for these good reasons:

Fuller Transmissions are designed and built for long, trouble-free service under the most severe operating conditions. These heavy-duty transmissions provide smoother shifting,

longer engine life and the right gear ratios for the job . . . all performance features that add up to faster work cycles and greater profits for Fuller Transmission users.

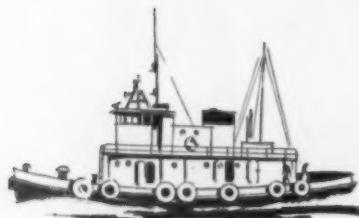
From more than 100 models available for rubber-tired equipment, you'll find a Fuller Transmission de-

signed to do your job better . . . and at lower-than-ever operating cost.

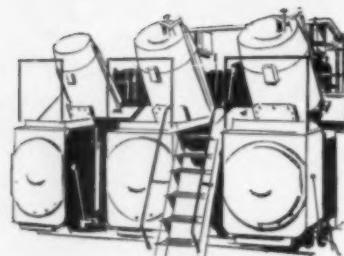


FULLER MANUFACTURING CO., Transmission Division • Kalamazoo, Mich.

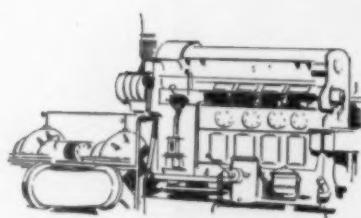
Unit Drop Forge Div., Milwaukee 1, Wis. • Shuler Axle Co., Louisville, Ky. (Subsidiary) • Sales & Service, All Products, West. Dist. Branch, Oakland 6, Cal. and Southwest Dist. Office, Tulsa 3, Okla.



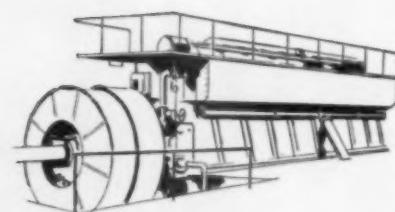
Marine



Engine compressor



Pumping



Stationary



GET THE BEST
FROM THE POWER
YOU BOUGHT...

WITH *Alnor*® PROTECTION

Accurate check of exhaust temperatures with an Alnor Pyrometer system can assure minimum fuel consumption per horsepower and long service from the power you bought—without the interruption of many common-cause breakdowns.

At a fraction of the cost of your present engine maintenance bill, an Alnor system can give you advanced warning of:

CYLINDER OVERLOAD SCALED JACKETS DETONATION
PREIGNITION CLOGGED PORTS FAULTY INJECTION

Series A Pyrometers are designed specifically for direct mounting on diesel engines or other equipment subject to vibration and rough usage. Readings are accurate to within + or -1%. Dustproof, fumeproof, splashproof. Switch capacities of 4, 6, 8, 10, 12 and 16 circuits. Other models to 31 circuits. Get full information—by return mail. Send for Bulletin 4361 with complete details of the Pyrometer and thermocouple assembly designed for your engine.



write:

ILLINOIS TESTING LABORATORIES, INC.

Room 508, 420 No. LaSalle St., Chicago 10, Illinois

CONWAY, ARKANSAS

BY leasing their municipal power plant to a non-profit corporation, Conway, Arkansas kept Hendrix College from moving out of town. This was 28 years ago and today, this same plant, which is paced by two big Nordberg Duafuel engines, is still a prosperous rich uncle to many worthy causes in the growing community.

Conway, located about 35 miles north of Little Rock, is a quiet town of 10,000 population. The Conway Corporation operates the electric system under a unique lease and franchise agreement that will be explained in detail. The town has grown progressively without ever having experienced a spectacular expansion of industry or home building. Some industry has moved into Conway and the tempo of business has increased at a modest rate but the power demands have increased chiefly as the result of greater per capita use of electricity in homes and businesses for operation of new appliances. Air conditioning has proved to be one of the biggest factors contributing to the need for increased generating capacity.

To meet the progressively increasing load on the power plant, two Nordberg Duafuel engines have been installed during the past six years. They are both seven cylinder, two-cycle units with $21\frac{1}{2}$ in. bore and 31 in. stroke. The combined Nordberg output to the power line is 4720 kw which is 57 per cent of the plant's 8020 kw capacity. The four original Fulton engines have a combined capacity of 3300 kw.

The first Nordberg was installed in the closing weeks of 1951 and went into full operation the following year. This unit operates at 225 rpm, is rated at 2750 bhp and drives a 1940 net kw generator. It has an attached positive displacement scavenging air blower. The second Nordberg, installed in 1956, is also a $21\frac{1}{2}$ in. x 31 in., seven cylinder unit but it operates at 240 rpm and is rated 3475 bhp with scavenging air supplied by a motor-driven centrifugal blower. It drives a generator with a net rating of 2470 kw after supplying electric power to operate the 350 hp scavenging air blower motor.

From the moment the first Nordberg went on the line, it carried the lion's share of the load. The engine only had time for a few hours of operation in 1951 after completion of installation. During the first five months of 1952, the operating staff was given time to familiarize themselves with the new engine and yet it was on the line about 75 per cent of the possible hours. Then the unit really went to work. From June 1952 until the end of December 1955, a period of 43 months, the Nordberg was on the line 28,379 hours out of a possible 31,419 or more than 90 per cent of the time. Producing 75 per cent of the entire plant output, the engine generated 36,071,600 kwhs. For the full six year period 1952 through 1957, this unit has produced 44,585,600 kwhs.

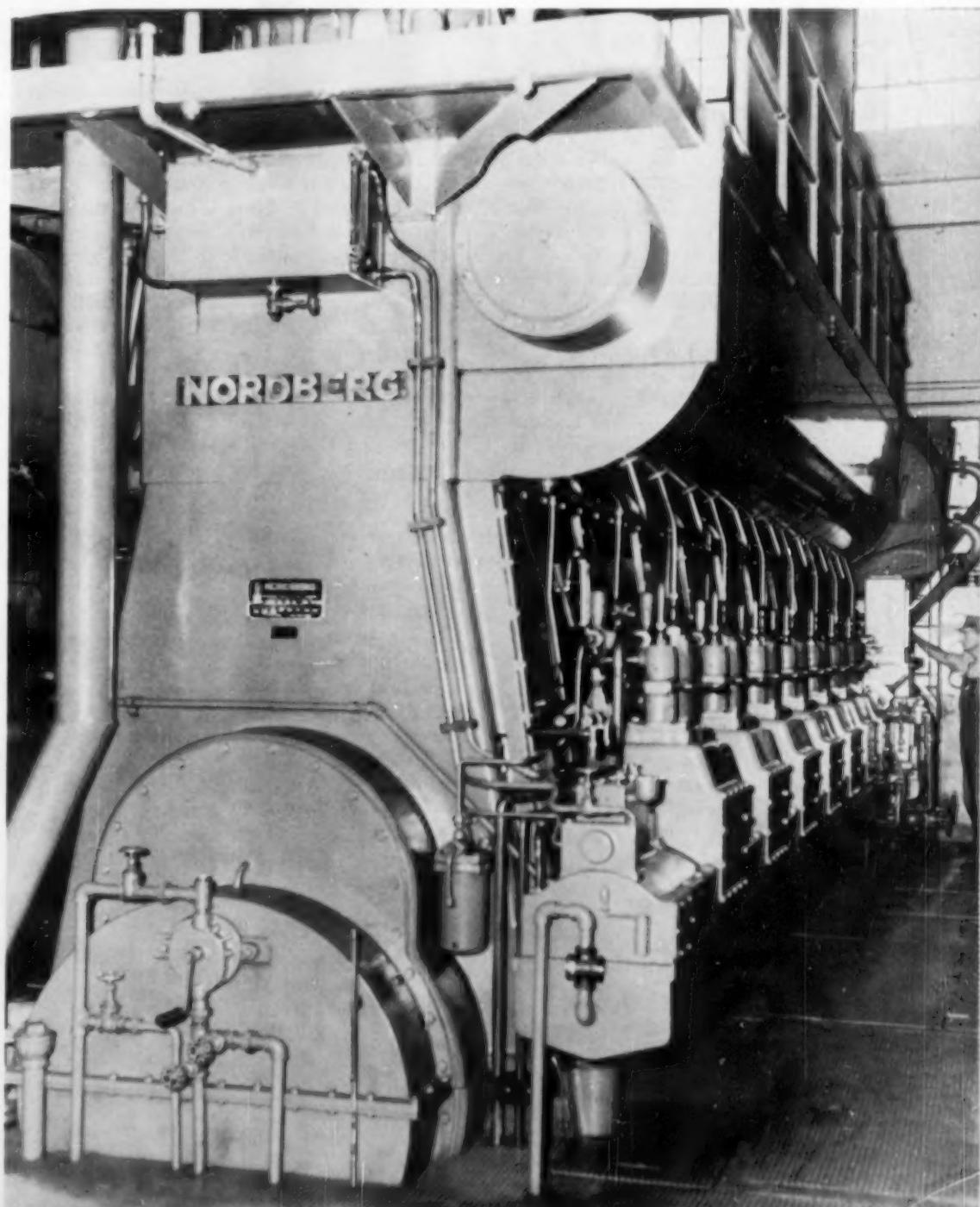
The newer engine entered service April 1, 1956. By the end of 1957, it had operated 14,309 hours or approximately 85 per cent of the time during

this 21 month period. It is operating at even greater efficiency and economy than had been achieved with the previous unit and has already generated 22,530,000 kwhs. Both of the Nordbergs have operated as needed, with no forced outages since their installation. Back of the development of the power plant is one of the most unique systems of municipal operation ever devised and probably the only one of its kind in the country.

Around 1895, the Conway Electric and Manufacturing Company started the plant and in 1901 sold it to the town for \$8,500 which was paid for by levying a 5 mill tax on real estate. It was first operated by a Board of Improvement until paid

out and then by the City Administration until 1929. At that time the Methodist Church found it necessary to make some changes in its educational setup and it was proposed to consolidate Hendrix College at Conway with Henderson-Brown at Arkadelphia. Little Rock wanted the resultant institution of learning to be located within their community and the little town of Conway wanted it to remain there as Hendrix College. To keep the college, the town had to contribute \$150,000 to the college for buildings, etc. It was an impossible amount to raise by public subscription. Conway had no such amount available and in any event it is unlawful to assess taxes to raise money for a private institution.

Front end view of Conway's first Nordberg Duafuel engine which has an attached scavenging air blower. From June 1952 through December 1955 it was on the line 90 per cent of the time (28,379 hours) and generated 36,071,600 kw while driving a 2250 kw generator at 225 rpm. Each cylinder is served by individual fuel injection pumps. Its perfect record of operation convinced Conway that the next installation should also be a Nordberg.



Confronted with this dilemma, the town fathers decided to organize a non-share, non-profit corporation and give it a lease on the generating plant and franchise for operation of the electrical system. The plan was executed and bonds were issued by the Conway Corp. to help save the college.

The Conway Corporation has a Board of Directors serving staggered terms and each time a term expires a succeeding member is chosen by the remaining members from among prominent business men of the town. Approval of the new member by the City Council is mandatory. No member may succeed himself except the Chairman of the Board. This is deemed advisable in order to have one member in close touch with operation over a long period of time. By a sort of gentlemen's agreement, the Conway Corporation also operates the water works as a measure of economy although the water system is under direct control of the city administration. The Conway Corporation is required to maintain the street lighting system and expand it as needed without cost to the city. Incidentally, the electric rates in Conway have remained consistently lower than in other towns in the region.

When the plant was taken over in 1929, it had a book value of \$217,000. The current value is \$1,660,000. The Conway Corporation has made contributions to colleges and schools and erected buildings to attract and preserve factories and businesses. This is all beneficial to the town. It has made franchise payments and given free services to the town totaling over \$1,250,000. It has a high credit rating with banks in Little Rock and does all of its own financing of the plant expansion and improvement so that the town has no bonded indebtedness in connection with the power and lighting facilities.

The Conway Corporation is insulated from political influence because a 20-year working arrangement has been renewed. This means that it is permitted to operate as an efficient business. The revenue and profit from operation can be employed to expand and maintain the plant in the very best condition and funds required for this

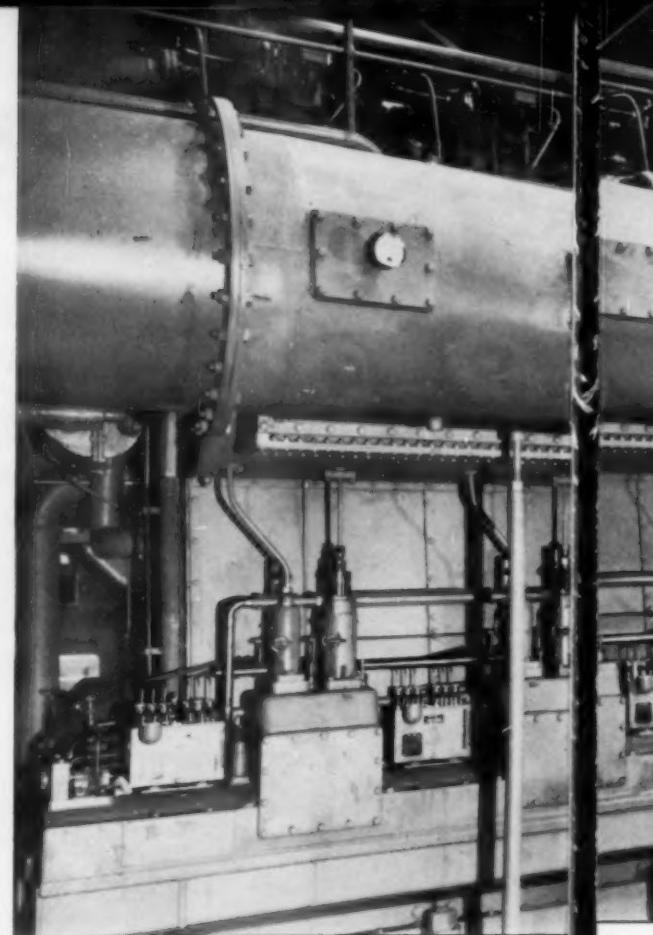
purpose cannot be diverted by the city. None the less, when matters of importance to the city and its growth come up, the Conway Corporation can step in and employ its funds and its credit to promote worthy causes such as attracting industries and business to the town.

A manager is employed to administer the affairs of the Conway Corporation. Currently Walter Scales directs the affairs of the corporation from a well appointed office where water and light bills are sent out and collections made, operating procedure for the system administered and plans for current and future expansions made. Conway Corporation does its own engineering.

The plant has long been successful but performance of the new Nordberg Duafuel engines reveals economy in operation considerably better than had been experienced prior to their installation. During the year 1956, the engines produced a kilowatt-hour at a fuel cost of just 3.8 mills. During the same period the overall plant operation, excluding interest and depreciation, was only 7.1 mills per kWh. This included all operating costs such as labor, supervision, fuel, lube, supplies and maintenance of plant and structure as well as engines and generators.

The engines have run long enough for establishment of routine inspection and maintenance policy. They are opened up once a year and the conditions found have been excellent. After 31,170 hours, the first Nordberg showed average cylinder wear of 0.025 in. There was no appreciable bearing wear and no major components have failed. The new engine, started in 1956, was opened up for inspection after 8280 hours of operation and showed an average cylinder wear of .0045 in., a maximum of .006 in. No bearing adjustments were needed.

During periods of inspection and overhaul, the lubricating oil is pumped out, batch filtered and put back in the engine before starting up. Each three or four months, depending upon the amount of operation, the oil is batch filtered. During the

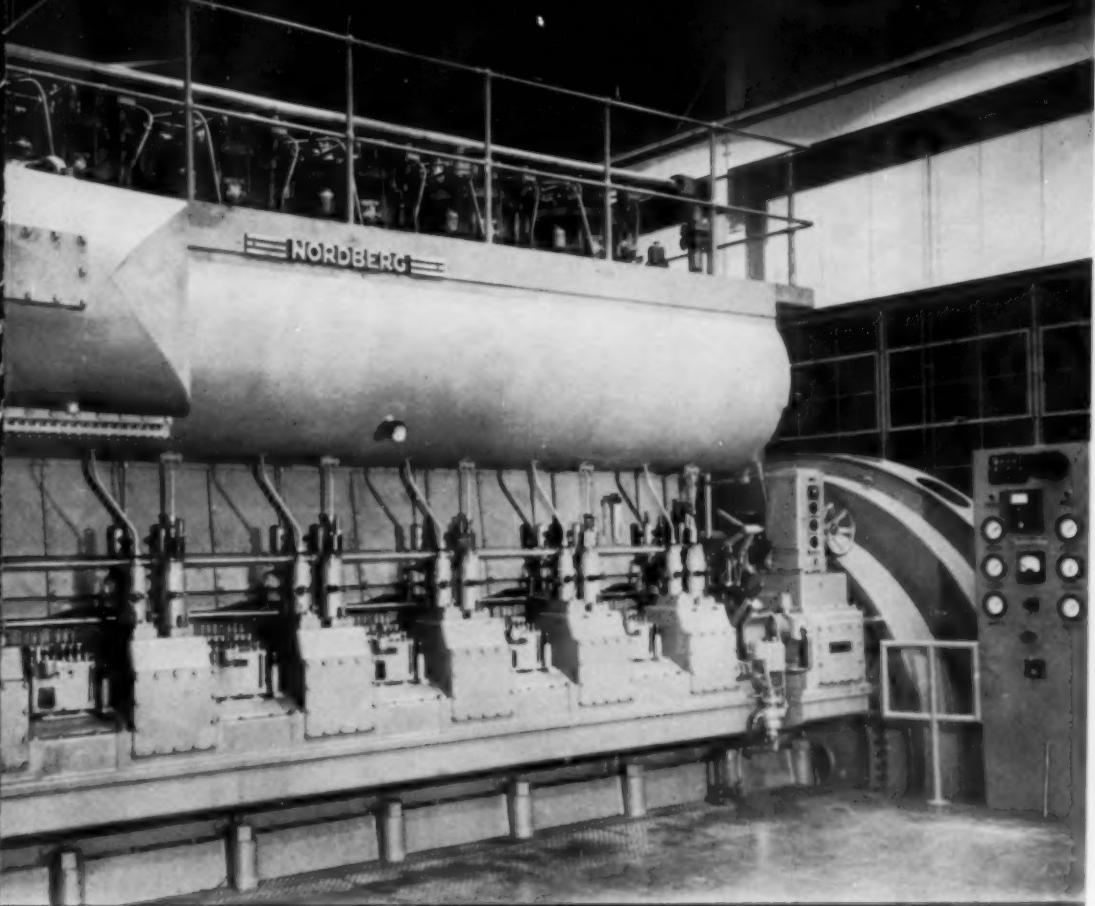


intervening period, it is by-pass filtered continuously and passed fullflow through twin Nordberg fine strainers. Oil in the system is never completely changed. Make-up oil is added from time to time as required in excess of the drippage from the cylinders which are lubricated with fresh oil by means of mechanical force feed lubricators for each cylinder. Main bearings, cranks, and other moving parts are pressure lubricated. The pistons are oil cooled and all of the oil in the system is circulated through shell-and-tube type lube oil coolers. The lube oil service pump is attached to and driven by the engine. A motor-driven pump provides before-and-after service and also acts as an emergency lube oil pump in case of failure of the attached unit-cutting in automatically in case of pressure loss.



EQUIPMENT SERVING NORDBERG ENGINES

Main Engines	Nordberg 3475 bhp, two-cycle, 7 cylinder, $21\frac{1}{2}'' \times 31''$, 240 rpm, Duafuel engine.	Nordberg 2750 bhp, two-cycle, 7 cylinder, $21\frac{1}{2}'' \times 31''$, 225 rpm, Duafuel engine.
Generator & Exciter	General Electric	Westinghouse
Scavenging Air Blower	American Blower	Roots Connersville
Scavenging Air Intercooler	Young Radiator	
Lube Oil B & A Pumps	Blackmer	Roper
Temperature Controls—Water	Robertshaw-Fulton Controls	Amot
Jacket & Raw Water Pumps	De Laval Steam	Allis-Chalmers
Air Filters	American Air Filter	American Air Filter
Silencers	Maxim	Maxim
Jacket Water Heat Exchangers	Ross	Ross
Lube Oil Coolers	Ross	Ross
Lube Oil Filters	Hilliard	Hilliard
Starting Air Compressors	Gardner-Denver	Gardner-Denver
Governors	Woodward	Woodward
Mechanical Lubricators	Manzel	Manzel
Fuel Filters	Nugent	Nugent
Exhaust Pyrometers	Illinois Testing Labs	Illinois Testing Labs



The newest Nordberg Duafuel engine installed at Conway has been running 93 per cent of the time. It is a seven cylinder, two-cycle diesel with cylinders of $21\frac{1}{2}$ " x 31", rated 3475 hp at 240 rpm. It has a motor-driven scavenging blower and drives a 2740 kw generator. Because of its fuel economy, it is operated almost continuously.

In general, auxiliary equipment is the same for both big engines except that the pump installations are not in similar locations. The engine and generator installation made in 1951 is in the original engineroom in space formerly occupied by a five cylinder air injection Fulton. The pumps are at ground level and are out in a pump house back of the engineroom.

When the second Nordberg was installed, it was necessary to add to the building thus also providing space for additional power in the future. A pump pit was provided at the front end of the engine, and since the new unit is scavenged by a

motor-driven centrifugal blower, a special extension was built to house the blower and motor. Each of the Nordberg engines has a closed cooling system and towers cool the raw water supply for circulation through the jacket water and lube oil heat exchangers and also for scavenging air intercoolers served by separate motor-driven centrifugal pumps. All of the water pumps are of motor-driven centrifugal type. Outside of the plant there is an aqua-tower for each engine to cool the air before it passes through the air filters. This is to correct an adverse atmospheric condition of heat and humidity that exists during a part of the year in the area of the plant.

The exhaust silencing arrangement back of the power house, the expansion joints and the hot pipe insulation, all conform to conventional practice. Silencing is very effective and the plant, which is in the middle of town, is an unobtrusive neighbor. Gas fuel is separately metered for each Nordberg whereas for the older engines the gas was collectively metered. The new arrangement permits accurate checking of the gas consumed by each Nordberg. There was no practical way to maintain a separate check on consumption of the older engines because there were always two or more on the line.

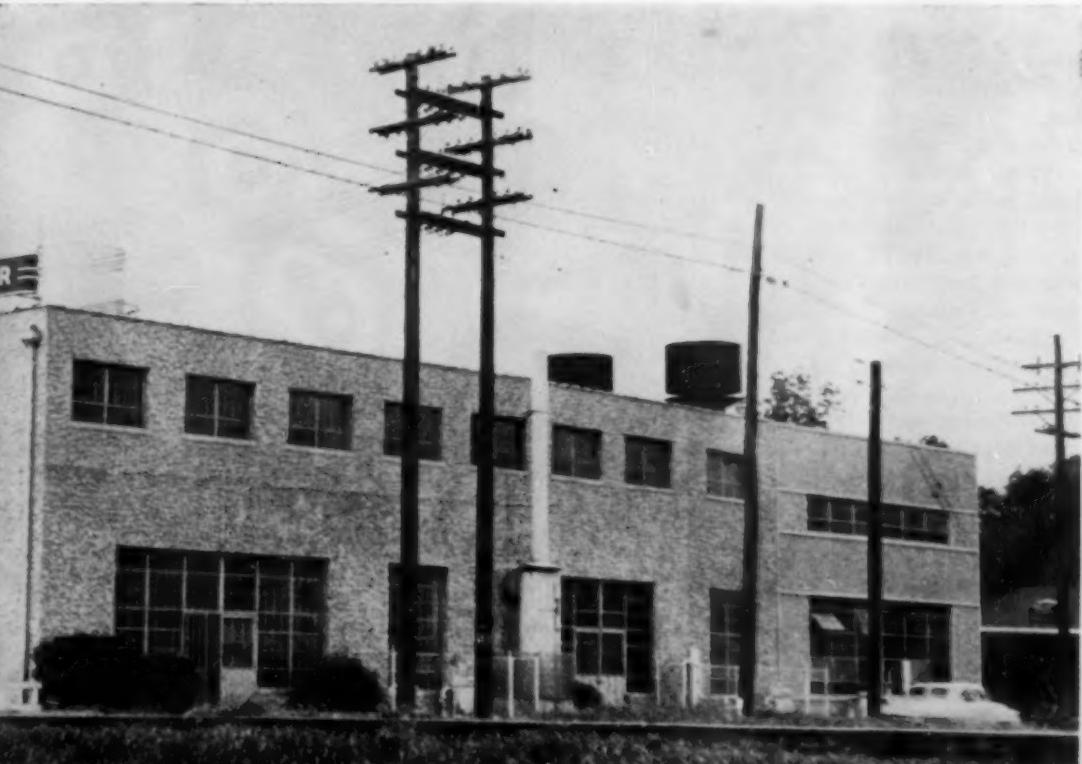
In the matter of instrumentation and protective devices, standard Nordberg procedure is followed. A single panel near the operation station is fully equipped with all pressure and temperature gauges, pyrometer to indicate exhaust temperatures, tell-tale lights and danger alarms. In addition, for each bearing there is an individual distant-reading dial thermometer installed at the side of the engine frame. The control which acts on the scavenging air flow to provide the correct gas-air mixture is separately installed on the engine-room wall. The reinforced concrete engine foundations rest on bedrock. This, plus the fact that the engines are extremely well balanced, totally eliminates vibration in the Conway plant and the surrounding terrain.

In both instances, the main generators are directly connected to the engines and the excitors are V-belt driven from the generator shafts. The 1951 installation carries a 1940 kw Westinghouse generator. This generator is a three-phase, 60 cycle, 4160/2400 volt ac unit. It is the first three-phase generator installed in the plant, all of the older ones being two-phase. However, by a special transformer-converter arrangement, both the old and the new generators supply three phase to the town's distribution system.

In the case of the 1956 installation, the engine at 240 rpm delivers 3475 hp and is direct-connected to a General Electric three-phase, 60 cycle, 4160/2400 volt ac generator. This generator is rated at 2740 kw, of which 270 kw is allowed for motor driven scavenging blower operation, leaving a net output to the line of 2470 kw.

Like most plants of its vintage, the one at Conway has been built a piece at a time as increased output became necessary. However, there is little evidence in external and internal appearance of the changes wrought except for the addition made in 1956 at which time steel paneling was used on steel frames. These are vertically channeled panels, insulated with fiber glass inside and steel faced. The new addition is 44 ft long and 47 ft wide, with a 27 ft rear extension to house the blower system for the new engine. It is painted gray to match the color of the stucco finish which covers the brick walls. The building is kept in excellent repair and up to a fine standard of appearance since it is quite conspicuous and as a matter of policy is made to reflect credit upon Conway.

It is anticipated that further generating capacity will be needed and to that end space has been provided in the new section of the building for another unit.





Loyd Lanotte, executive vice president, and Arno R. Dalby, president of TIME, look over TIME power unit at Lubbock yard.

General offices at Lubbock house the nerve centers of TIME's well organized management which is broken down into six areas of responsibility.

DEPENDABLE DIESELS HELP KEEP TIME ON TIME

By DOUGLAS SHEARING

TI.M.E., Incorporated, Transcontinental Motor Freight Carrier with headquarters in Lubbock, Texas, is proud of its ability to live up to its slogan, "so dependable, it's scheduled!" TIME is quick to point out, however, that without diesel engines for its line equipment, this slogan would be very difficult to live up to. TIME operates some 200 pieces of diesel line equipment with power about equally split between Cummins and GMC Diesels. The Cummins-powered equipment operates west of Memphis, Tennessee; the GMC-powered equipment operates east of Oklahoma City; the Oklahoma City to Memphis run finds some overlap, caused by TIME's divisional breakdown. All major overhauls on Cummins equipment are performed at Lubbock, Texas; and this work on GMC-powered equipment is handled at Nashville, Tenn. shop. This allows TIME's two major shops to each specialize on one make of engine.

TIME feels that a goodly measure of the operating dependability it receives from its equipment

is based on driver condition. It is one of TIME's basic practices to plan all possible runs so that the driver gets his rest at home, in familiar surroundings. TIME service control has arranged the dispatching of line equipment so that on all but three divisions the drivers leave home and drive to a mid-point of their division runs. At this mid-way point, the driver meets another driver who started from the opposite end of the division at a corresponding time. The drivers then simply swap rigs, and each finds himself on his way to his home terminal. Thus, rest at home means a happier, healthier, more alert driver and consequently, a more efficient driver.

As each piece of line equipment arrives at a division point, it is checked and inspected by maintenance crews before being dispatched on to its next division. Each tractor and trailer is given an ICC inspection at each division point. Incidentally, engines are not given a chance to get cold, as TIME feels this is a must for long engine

T.I.M.E., Incorporated, is sure enough of its operations to issue a daily schedule. The reliability of the diesel engine is one of the foremost factors in making the operations of this carrier over 3506 miles of transcontinental routes "so dependable, it's scheduled!"





▲ Shot in the Lubbock shop, where all major overhauls of Cummins diesel equipment are made.

TIME tractor and trailer enter the thriving city of Tucson. TIME operates 1,000 vehicles on its 3,506 miles of ICC authority between Los Angeles and Atlanta, Cincinnati, Evansville and St. Louis.

life. TIME, at present, follows a planned schedule which calls for major engine overhauls every 300,000 miles on their heavy Cummins equipment. Experiments are currently underway, however, to determine the possibility of extending this mileage to perhaps 400,000 miles between major overhauls. Majors on the smaller Cummins and GMC engines come more frequently. Major overhauls at TIME cover all engine repairs with the exception of fuel pump, water pump and valve overhauls, which come at lower mileage schedules.

TIME, which operates over 3,506 miles of rights stretching from Los Angeles at the western end to Cincinnati, Ohio and Atlanta, Georgia on the eastern end, has operated for nearly two years on a scheduled basis, and the schedule has proven more than 95% effective. The fact that the firm keeps careful IBM records for all its activities, even including overhaul and maintenance on equipment, is one of the reasons cited for this high degree of efficiency. The dependability of TIME itself has been the key factor in the company's remarkable 500% growth record in the past five years. TIME's history goes back to 1929, though the company got its present name in 1945. Arno Dalby, president of TIME, began his trucking operations in 1929 hauling goods in a Model T truck between Post and Lubbock, Texas, a run of 38 miles. Today, TIME figures its line and pickup equipment cover a distance equal to three times around the world at the equator each working day; a far cry from Arno Dalby's first 38 mile run.

6000 KW TRANSPORTABLE DIESEL PLANT

Three 2000 kw Mobile Generating Plants with One Centralized Control Unit Combine to Form a New Method for Solving One of the Public Utilities' Most Pressing Problems - Peaking and Reserve Capacity

By DWIGHT P. ROBISON

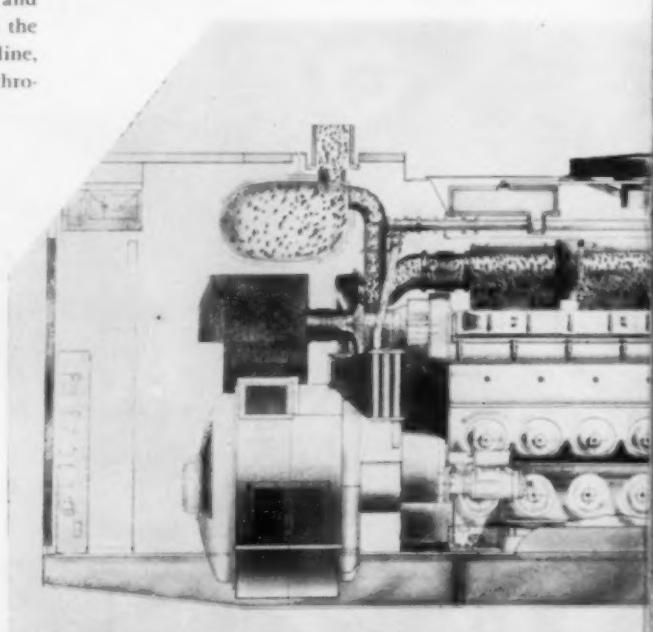
A NEW design of transportable diesel peaking and reserve plant with 6000 kw capacity was announced by executives of Electro-Motive Division of General Motors in papers delivered before the System Planning Committee meeting of the Pennsylvania Electric Association at Garden City, Long Island, recently. The design has been developed out of experience of Electro-Motive in manufacture and observation of 180 units of 500 kw and 1000 kw Electro-Mobile Power Units in the last three years, and its quarter of a century of experience in building diesel-electric locomotives.

The Electro-Motive speakers were: N. C. Dezendorf, vice president of General Motors Corporation and general manager of Electro-Motive Division, La Grange, Ill., R. B. Johnstone, regional engineer of Electro-Motive Division, New York City, and B. H. Hefner, chief electrical engineer, Electro-Motive Division, La Grange, Ill.

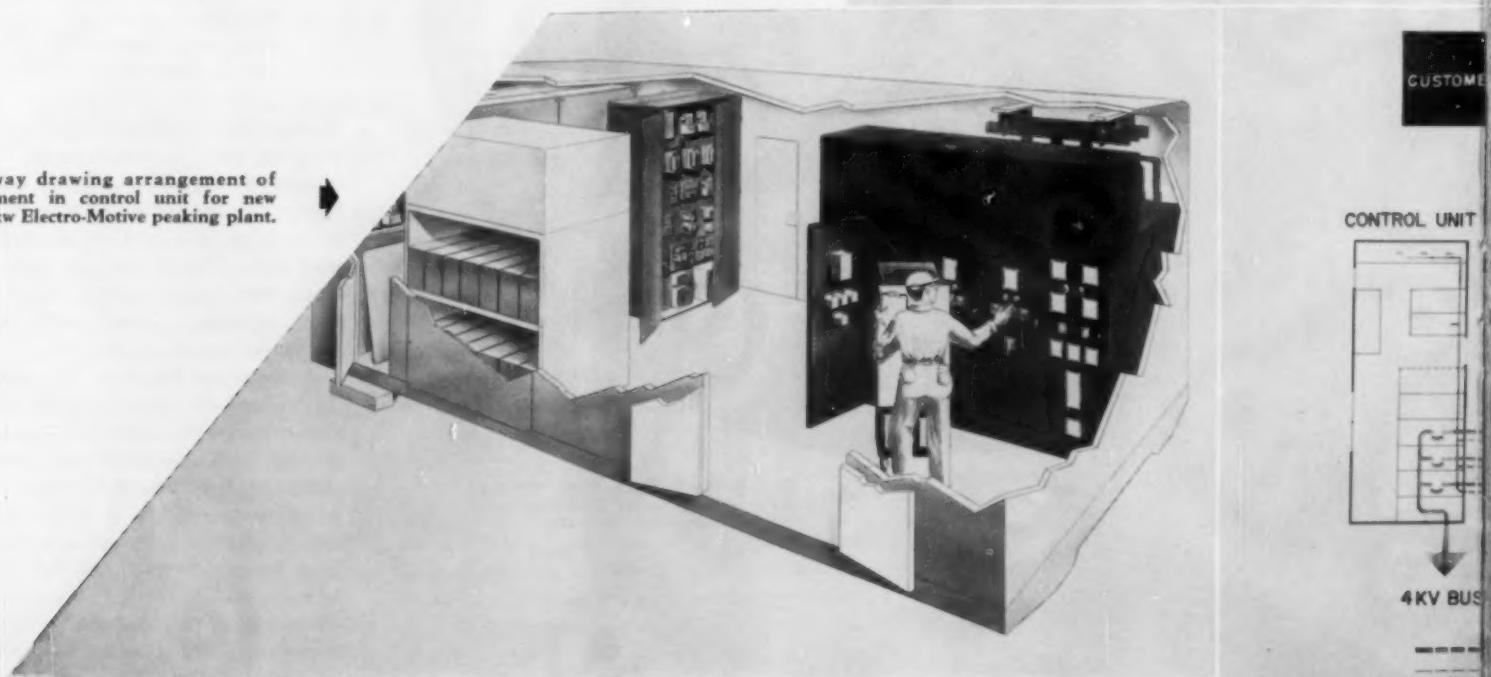
The new peaking plant consists of three 2000 kw generating units, each in its own steel, weather-proofed, sound-deadened housing, and one control unit with similar all-weather housing. Each generating and control unit is so complete in equipment that it is only necessary for the utility to provide a stone and railroad tie, or concrete base, couple the cabling and provide a fuel tank. The entire plant with transformer will occupy a lot

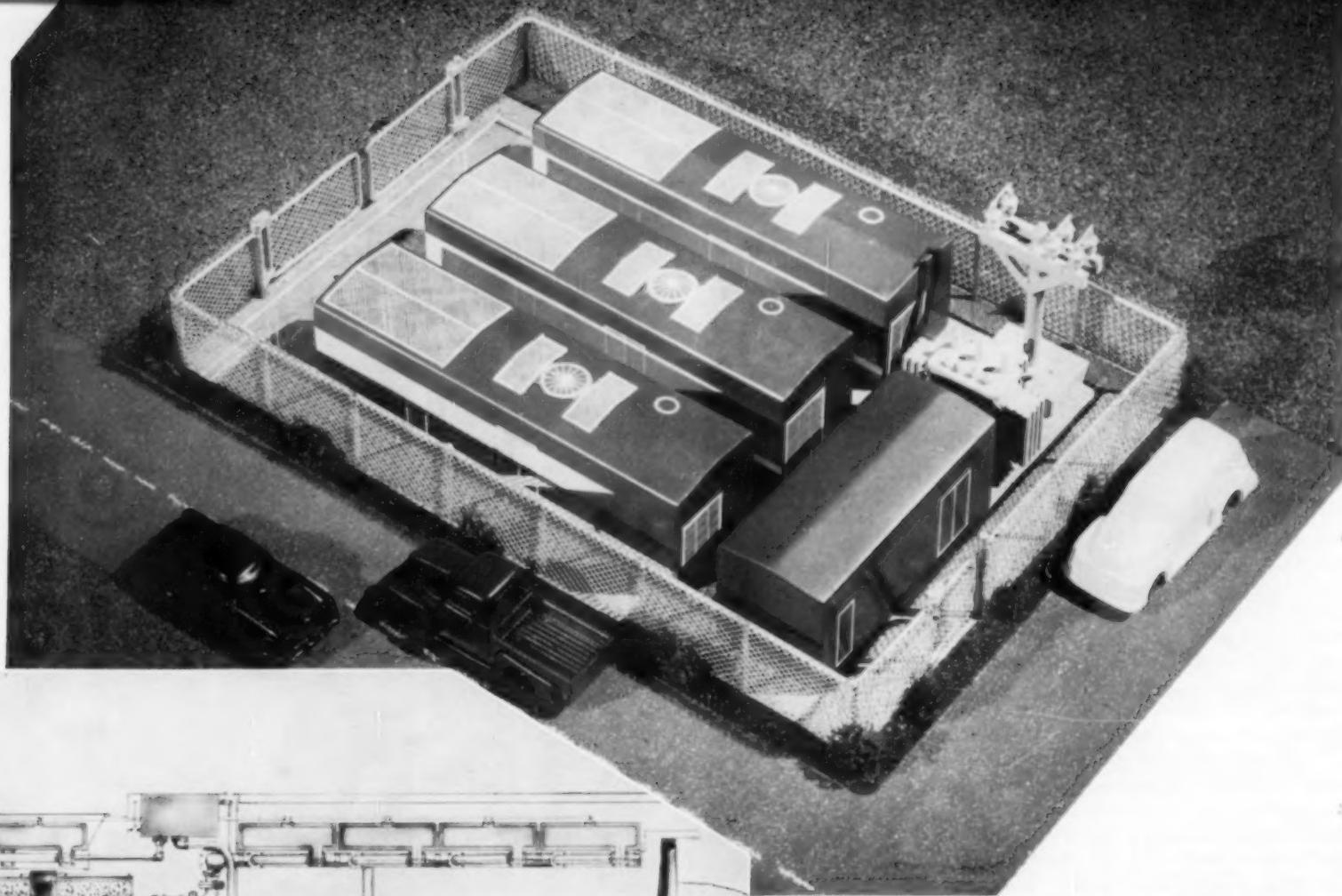
no larger than that needed for a small house. The plant has been designed with a very low sound level, assuring that it will be a good neighbor. As in the case of their predecessors, the 1000 kw Electro-Mobile Power Units, the new peaking plants are designed for completely automatic or remote control. Each 2000 kw generating unit weighs about 50 tons and each control unit about 17 tons. Each can be shipped on a standard forty ft flat car and transferred to a low-boy trailer for hauling to the installation site. The plant can be brought on-line, with all three generators full load and synchro-

Sideview drawing showing arrangement of components in one of the three 2000 kw units that make up the new Electro-Motive 6000 kw peaking plant.

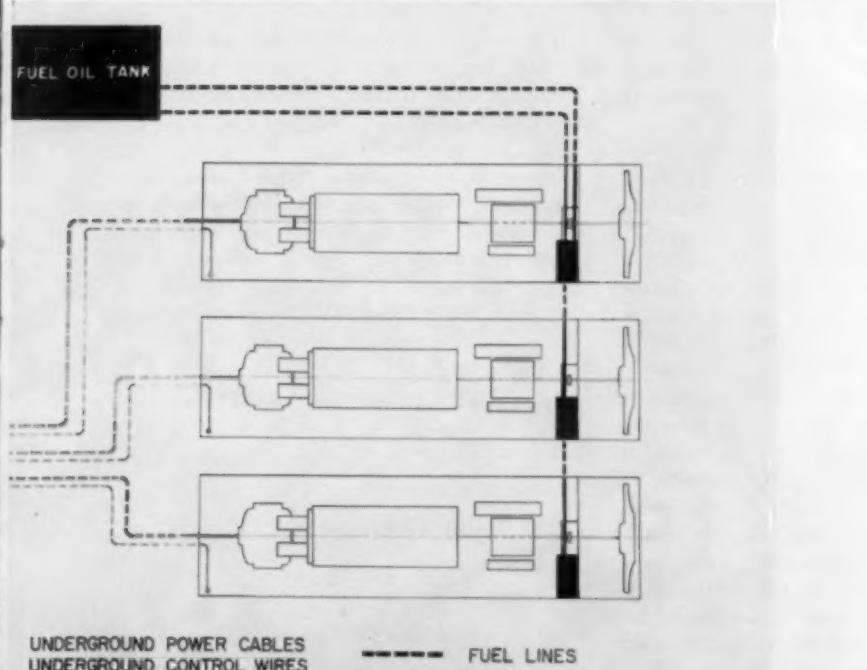
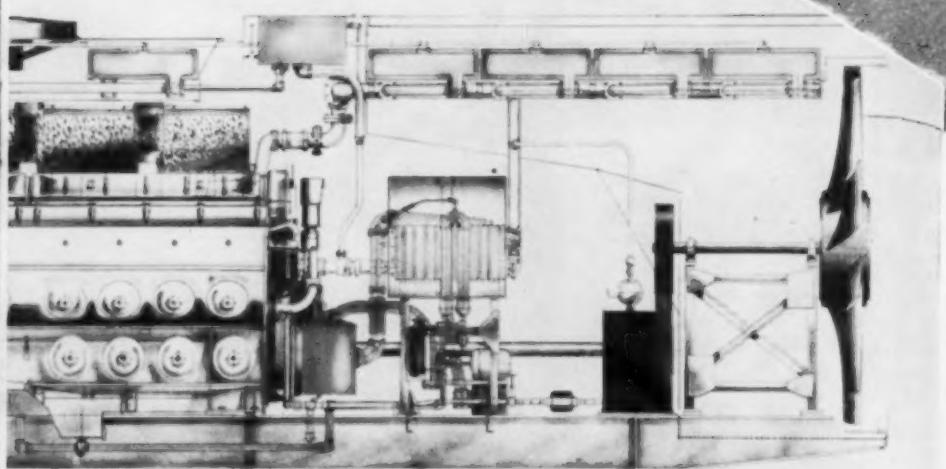


Cutaway drawing arrangement of equipment in control unit for new 6000 kw Electro-Motive peaking plant.





Scale model of new 6000 kw Electro-Motive peaking plant.



nized, within ninety seconds. The controls have many system operation and flexibility advantages because of the wide choice of control methods. With the addition of voltage or current sensing equipment the plant can be brought into operation automatically by a given condition. It can be operated by time clock starting and stopping. It might be operated from a central dispatching station. Or, a combination of starting methods can be used. Whatever the method, no operator is required to start the plant.

With its already established manufacturing facilities Electro-Motive makes it possible to match load growth as it occurs, since prompt four to six month delivery can be made. Thus it is possible to postpone installation of expensive facilities, and chart needs more accurately, while providing for peak load growth at the lowest possible investment. Electro-Motive also announced that its unit exchange program, in effect for its railroad customers for many years, provides for the quick replacement of any major component up to and including a whole 2000 kw power unit. It further announced that the Division is willing to work out a basic contract covering all scheduled servicing to be done by Electro-Motive with any utility which embarks upon a program of planned acquisition of the new plants.

General layout of new 6000 kw Electro-Motive peaking plant. Plant is so completely assembled and equipped at the factory that all utility must do is provide base, site equipment and lay underground cables as indicated in the drawing.

NEW ENGINE ANNOUNCED BY CATERPILLAR

By DOUGLAS SHEARING

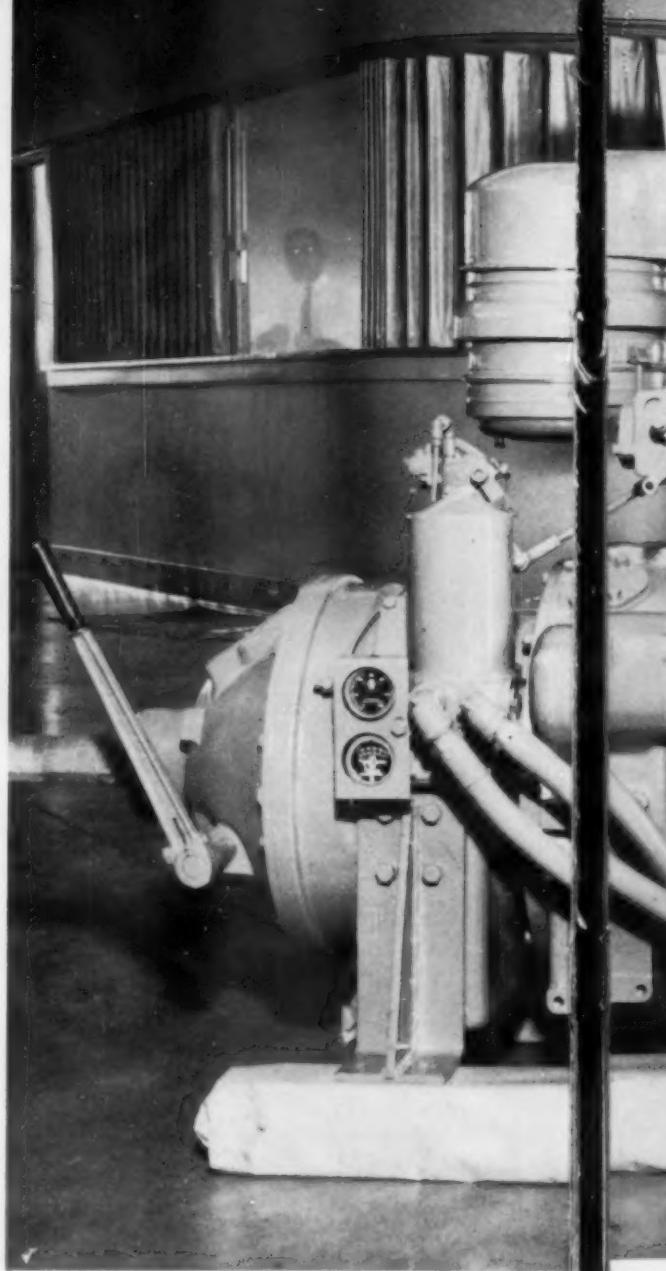
ANOTHER new diesel engine has been announced by Caterpillar Tractor Co. Engine Division. It's the 4-cylinder D311 series H. This modern, heavy-duty unit has a 4 in. bore and a 5 in. stroke. It's a 4-cycle, naturally aspirated, valve-in-head model and employs the same precombustion chamber type design used on all Cat diesel engines. The 252 cu in. displacement engine develops 75 hp at 2400 rpm. It has an intermittent output rating of 68 hp and a continuous rating of 50 hp at 2000 rpm. The generator for use with this engine has a 30 kw continuous rating and is completely self-regulated. A turbocharger which will soon be available will considerably increase all the above ratings. This engine is another in Caterpillar's trend to produce new, more powerful models with smaller dimensions than the engines they replace in Caterpillar's line of diesels, while retaining the quality engineering and design that have marked Caterpillar as a builder of durable engines with long life characteristics. In replacing the Cat D311, the D311 series H maximum output capacity has

increased 10 hp or more than 15%. Size has been so reduced that it is 9 in. shorter, 17 in. lower and weighs 350 lbs less than the D311.

The engine uses precision-type aluminum alloy bearings which resist the corrosive acids found in engine crankcases. There are 5 main bearings of $2\frac{1}{4}$ in. diameter with a total length of 5 in. Thus, bearing pressures are such that normal operation should provide eight or more thousand hours operation before bearing replacement is necessary. To further increase the long life features of this engine, Caterpillar uses a forged alloy steel crankshaft with Hi-Electro hardened journals. Super-finishing and dynamic balancing also provide improved performance. Uniform temperature is maintained and ample heat dissipation is provided through use of wet-type cylinder liners. These Hi-Electro hardened liners are easily replaced. Another feature of this unit is the harmonic balancer which provides smooth performance with a four-cylinder engine. This is a Lanchester type balancer which reduces the objectionable vibrations which often accompany four-cylinder engines.

This 30 kw generator is designed by Caterpillar for use with the D311 (series H). It is completely self-regulated with the only adjustment being belt tension. Close voltage regulation with ability to start large motors and carry large overloads are features of this unit.

The fuel system is of the same general design as that which has been used on all other Cat engines. It employs the use of capsule-type fuel injection valves and pumps which are completely free from all field adjustments. No delicate checks or adjustments are necessary for proper operation. This system makes it possible for Caterpillar engines to operate on a wide range of fuels. No. 3 furnace oil, a low cost fuel, provides the same dependable, non-clogging operation as JP4 jet fuel, a very expensive, high grade fuel. One big advantage is that the same fuel system is used for these or any grade fuel between them. In terms of economy the owner can take advantage of the higher work capacity of these low cost fuels to boost his earnings considerably. To provide the type of starting best suited to any application, Caterpillar offers three methods for starting the D311 series H. Air or electric is available for automatic starting or for applications where speed, safety and convenience are required. For all-weather starting, most owners prefer the dependable gasoline starting engine. The D311 series H has a new gasoline engine that is side-mounted instead of end-mounted as on the old D311. This provides a shorter installation. It is a two-cylinder vertical engine which mounts on the right hand side of the diesel. It is available with a 12-volt electric starting motor or with a self-retracting pull cord. When the gasoline starting engine is used to start the D311 extra life is added to the diesel. The diesel is conditioned before it starts. Warm air and water from the starting engine circulate through the diesel, warming

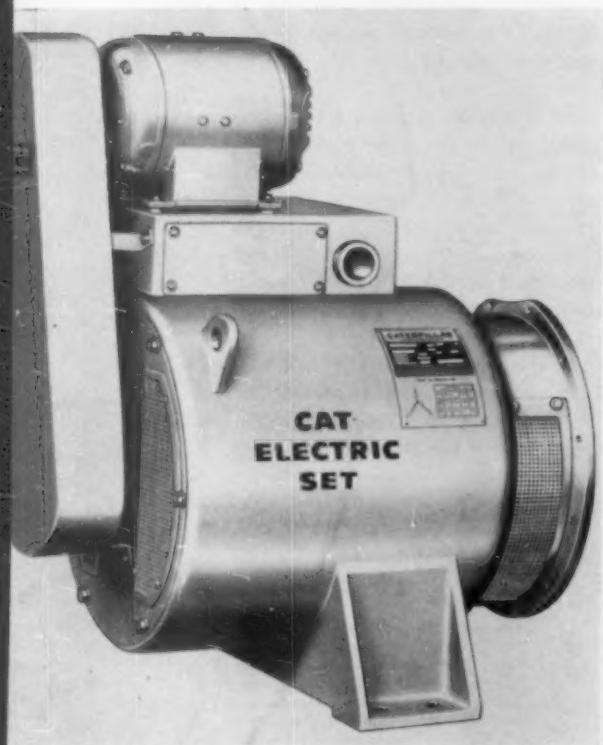


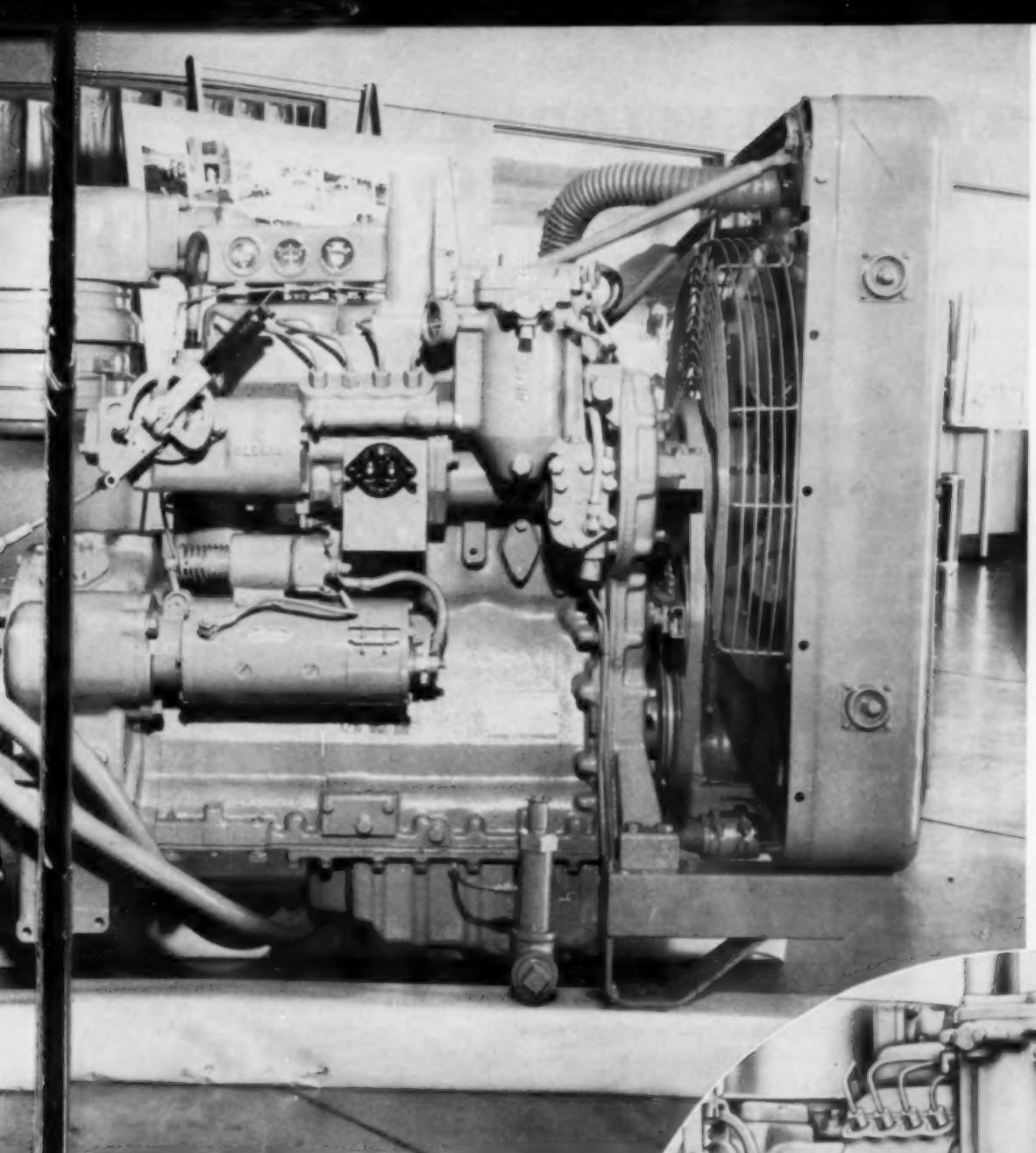
it before it begins to turn over. After starting engine engages diesel, oil pressure is established before the first cylinder fires. This process assures good lubrication, sure starts and long life.

Caterpillar reports that a complete line of attachments will be provided including radiators, heat exchangers, clutches, torque converters, generators, marine gears, power take-offs and many others. Parts and service for both the D311 and D311 series H will be handled by the nearly 900 Caterpillar dealer stores throughout the world.

Brief specifications for the D311 series H:

Bore & Stroke	4" x 5"
Piston Displacement	252 Cu. In.
Over-all Dimensions, Approx.	
Length	44"
Width	27 $\frac{1}{4}$ "
Height (excluding exhaust stack)	36"
Weight, dry	1,216 lb





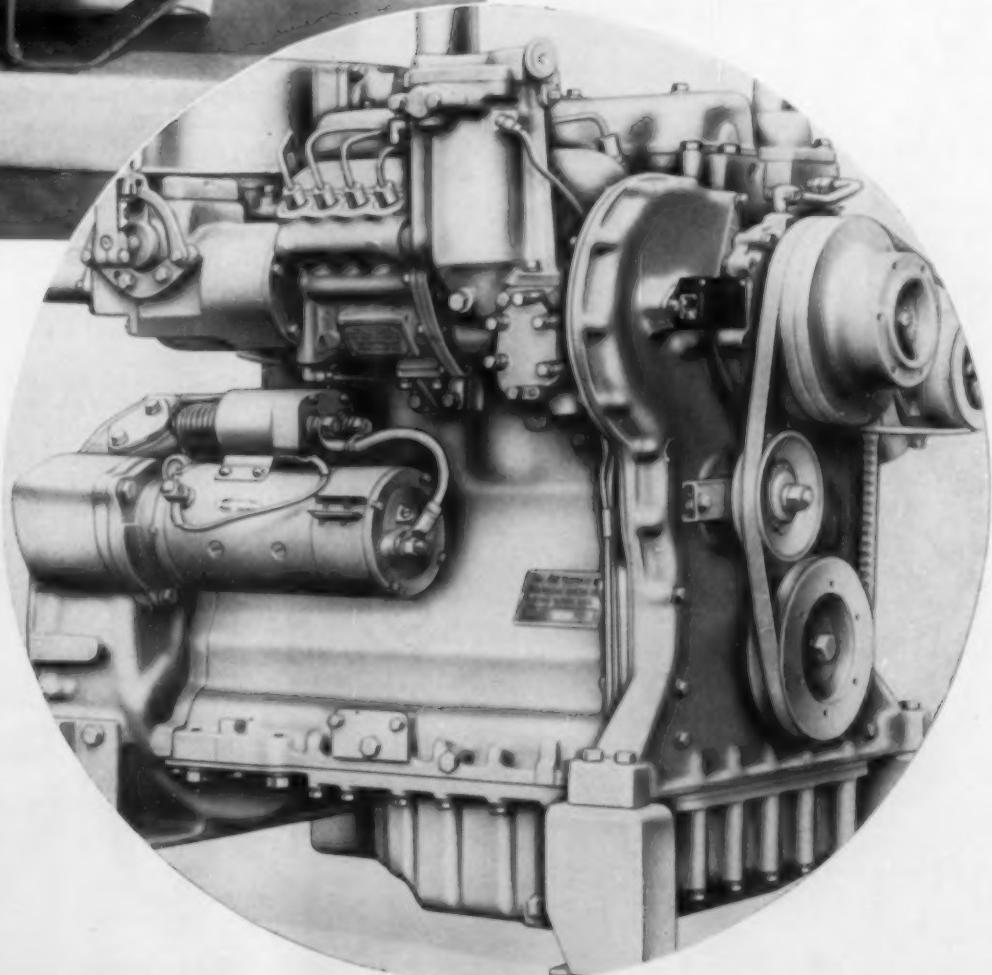
The D311 series H shown here is equipped with Delco Remy electric starting, radiator, Twin Disc torque converter, clutch and glow plug starting aids. It is ready to set in a $\frac{1}{2}$ -yard excavator.

The fuel injection capsule (shown here in the right hand) is approximately $1\frac{1}{2}$ inches long. Although replacement is seldom required, when necessary, it's simple.



The wet-type cylinder liner used on the Cat D311 (series H) is chemically etched to assure good seating of piston rings.

Compact design is illustrated in this view of the D311 series H, which also shows the electric starting motor attachment. The fuel injection pump housing is seen directly above the starter.



METALLURGICAL DEVELOPMENTS FOR HIGH OUTPUT DIESELS

The Ni-Resist Family of High Nickel Austenitic Iron Alloys Solves Problems for Parts of Diesel Engines That Are Constantly Subjected to High Temperatures and Corrosion.

TODAY thousands of buses and motor trucks use efficient turbocharged diesel engines to boost power, cut fuel consumption and improve the power/weight ratio of the engines. The turbocharger on a diesel engine really operates as a small gas turbine, using the power from engine exhaust gases to compress and feed air for more efficient combustion. It has a casing or housing, a nozzle ring, an expander wheel, and a shaft which is common with the impeller wheel. By helping the engine breathe more deeply, the turbocharger can boost the power output of even small diesels as much as 100%. But the exhaust gases that spin the charger's turbine wheel at 40 to 60,000 rpm are as hot as 1,400°F, and it takes good materials to stand up in this heat.

The success of turbochargers built by the leading manufacturers has been helped considerably by heat-resistant nickel-containing materials and their ability to withstand elevated temperatures, producing an efficient dependable unit. Turbochargers built by the Elliott Company, Jeannette, Pa., use type 2 Ni-Resist which is 20% nickel and 2% chromium austenitic cast iron for the turbine inlet casing and the nozzle ring, with vanes of type 302 stainless steel and Haynes Alloy No. 31, which is 10% Ni, 25% Cr, 8% W for the expander wheel. The use of type 2 Ni-Resist iron for several of these hot parts solved the heat problem for Elliott. This material permitted the development of a turbocharger that would economically meet the service demands for diesel powered vehicles. This

alloy has 12 times better resistance to growth than plain cast iron and 10 times better scaling resistance. Ni-Resist castings maintain their strength and stability at high temperatures and resist heat and corrosion. They also resist growth and free scaling, an important property, since impact from scale and loose metallic particles could damage the entire unit as well as unbalance the wheel and shaft. In addition, this type 2 Ni-Resist iron has a coefficient of expansion which matches that of austenitic stainless steel. Thus stainless steel blades can be fused in when the nozzle rings are cast without running the risk of cracking out during the violent temperature changes taking place in operation. This construction has resulted in long life and excellent dependability for these critical parts of the turbocharger.

The Schwitzer Corporation, Indianapolis, Indiana, makes a turbocharger having a type 2B Ni-Resist turbine inlet casing, a chromium-nickel stainless steel nozzle ring, and Haynes alloy No. 31 expander wheel. The largest size turbocharger uses a casting made of type D-2 Ni-Resist ductile iron for greatly improved strength at service temperatures. A feature of this turbocharger is the relative ease with which it can be mounted on the engine. Its lightweight construction and strength permits mounting the turbine casing flange on the engine manifold with no additional support. This simplifies engine maintenance, since only four bolts are involved. Schwitzer supplies turbochargers to many diesel manufacturers including Mack Truck Co.,

International Harvester Co., Waukesha Motor Co., Caterpillar Tractor, and Hercules Motors. The use of nickel-containing heat and corrosion resistant materials in these units provides longer service life and a high degree of dependability. The Cummins Engine Company, Inc., Columbus, Indiana, uses Ni-Resist iron on the power casing of its turbocharger. This part is designed in two parts, an exhaust casing and a turbine casing. Cummins specifies type 2B Ni-Resist iron because it resists high temperature warping, scaling and corrosion, and meets the required high strength levels. Another important user of Ni-Resist castings in turbochargers is Thompson Products, Inc., of Cleveland.

Other Ni-Resist Uses in Diesel Engines

It is now possible to salvage forged aluminum pistons from diesel engines when their ring grooves become excessively worn, thus permitting more service life from these pistons, and at about half the cost of new pistons. This added service life is made possible by bonding type 1 Ni-Resist piston ring groove inserts into the pistons at the top ring groove area. This area receives the least amount of lubrication and is subject to heavy pounding by the piston rings. Ni-Resist austenitic cast iron is used for these inserts because it closely matches the thermal expansion of the aluminum alloy, and it withstands severe heat, corrosion, metal-to-metal wear and galling, and piston ring pounding. United Engine & Machine Co., San Leandro, Cal., has made over a million bi-metallic pistons, prin-



cipally for engines used to power heavy duty trucks, buses and tractors, equipped with bonded-in Ni-Resist inserts, under license by Al-Fin Division of Fairchild Airplane and Engine Co., Deer Park, N.Y., developers of the bonding process.

In designing pistons for both diesel and gasoline engines where top ring groove wear is a problem, the Zollner Corporation, Fort Wayne, Indiana, produces a piston under their trade name Bond-o-loc. This design consists of casting in at the time of manufacture a Ni-Resist piston ring carrier, bonded by the Al-Fin process with an additional locking device to preserve the life of the bond and act as an additional factor of safety. These pistons are supplied as original equipment for many large manufacturers of diesel engines where the operating conditions are particularly severe. The Ohio Piston & Machining Company, of Cleveland, has adapted for railway locomotive diesel engine pistons, a ring carrier with Ni-Resist inserts bonded in by the Al-Fin process. This company reconditions worn pistons by replacing the all-aluminum top ring groove sections with new Ni-Resist aluminum bonded carriers, welded in place.

Ni-Resist manifolds on diesel engines resist oxidation at temperatures up to 1,400°F, eight to ten times better than unalloyed cast iron. More important is the resistance to cracking and warping



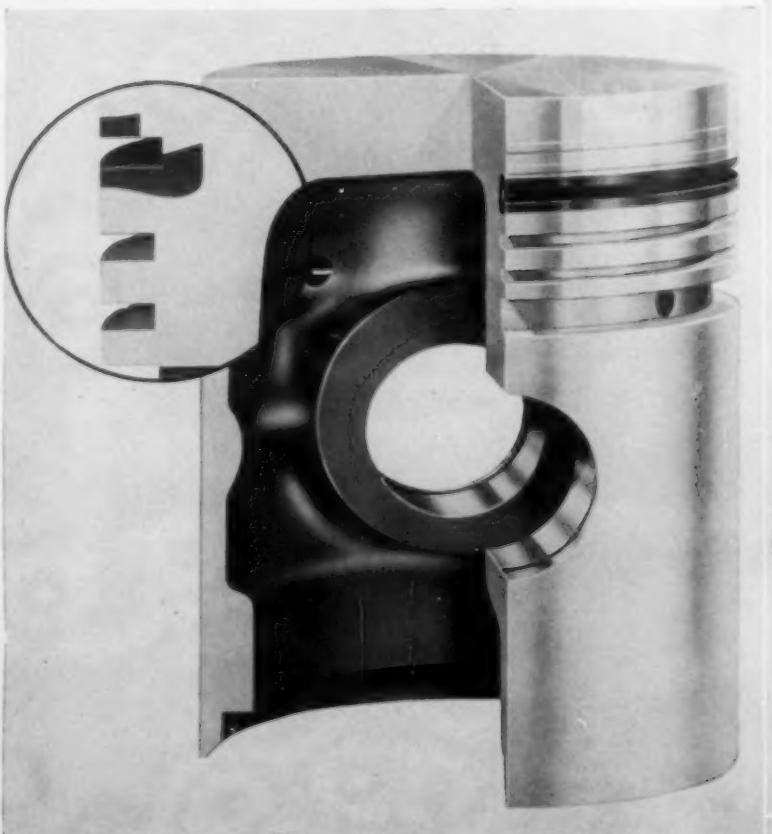
Diesel powered trucks get more service from aluminum pistons having Ni-Resist piston ring inserts.

afforded by Ni-Resist types 2, 2B or 3, as compared with conventional cast iron; type 2B contains higher chromium, and type 3 is a 30% Ni, 3% Cr alloy. Type 3 Ni-Resist manifolds on Alco diesels operating on New York Central locomotives, last 24 to 30 months before requiring replacement. Cummins Engine Co. also uses Ni-Resist type 2B

for manifolds. Exhaust valve guides in diesel engines require a material that has resistance to a combination of heat, wear, corrosion and erosion from hot gas flow. Type 2 Ni-Resist iron has shown long life advantages for this purpose. Koppers Company, Baltimore, Md., is a manufacturer of these parts that use Ni-Resist iron.

Manifolds as well as turbine casings on the turbochargers of this 600-hp VT-12 Cummins Turbodiesel engine are made of Ni-Resist castings to resist corrosion, scaling and warping and for more dependable service.

Longer life for aluminum pistons is assured by bonding Ni-Resist piston ring inserts in top ring grooves. These inserts closely match the expansivity of the aluminum alloy and withstand severe heat, corrosion, metal-to-metal wear and galling.



THE VOICE OF JIM CREEK

Probably the World's Most Listened to Radio Station Is the U.S. Naval Radio Transmitter at Jim Creek, Oso, Washington

JIM CREEK, Oso, Wash.—A Worthington diesel engine with its generator situated in a deep canyon in Washington's Cascade Mountains is playing a vital part in the defense of the United States. The 3600 hp diesel and 2500 kw generator provide standby power for the U. S. Naval Radio Transmitter at Jim Creek, Oso, Washington, the largest-known operating radio transmitter in the world. The semi-isolated naval radio station, covering about 6600 acres, is located about 55 miles northeast of Seattle. The 1,000,000 watt transmitter can reach ships, submarines, and aircraft anywhere in the world at any time of the day or night. "We installed the Worthington standby generator as insurance," Commander L. J. Larkin, commanding officer of U. S. Naval Communication Station at Seattle, explained. "We must be able to send messages 24 hours a day, 365 days a year. A failure in commercial power lines could put us out of action as effectively as a bomb." When the Navy set up the standby equipment, it not only provided for emergency power but also realized a sizeable saving in the price it was paying for commercial power. "We reduced our 'demand power' requirements on Bonneville Power Admin-

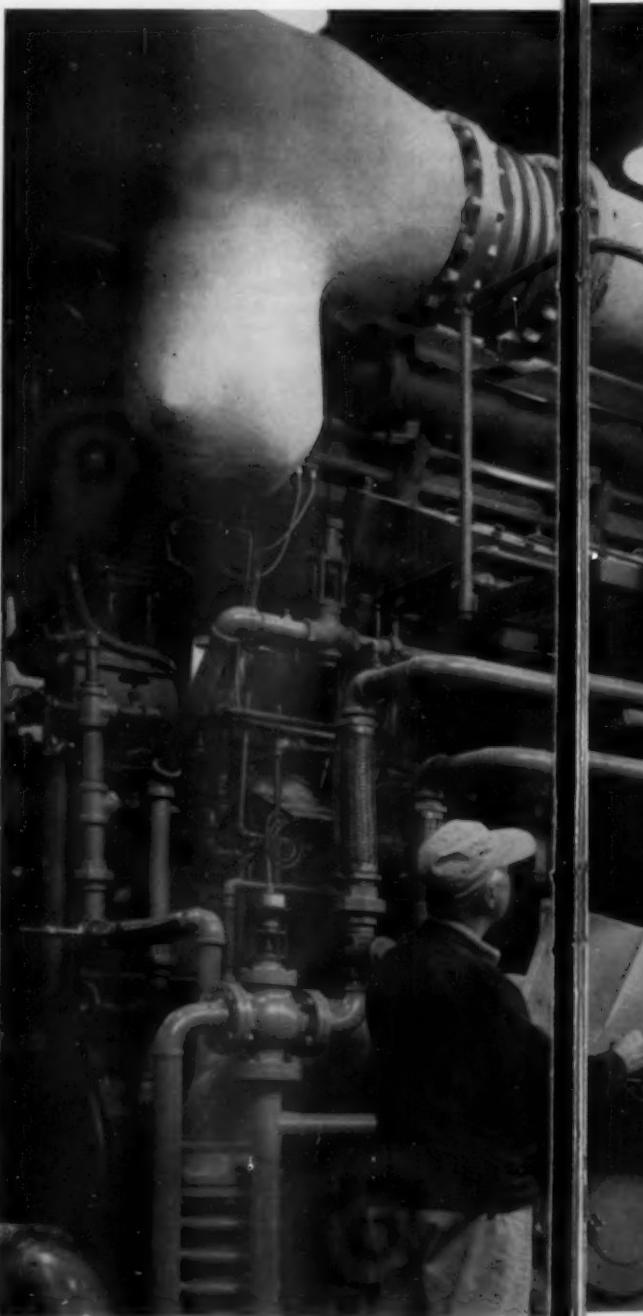
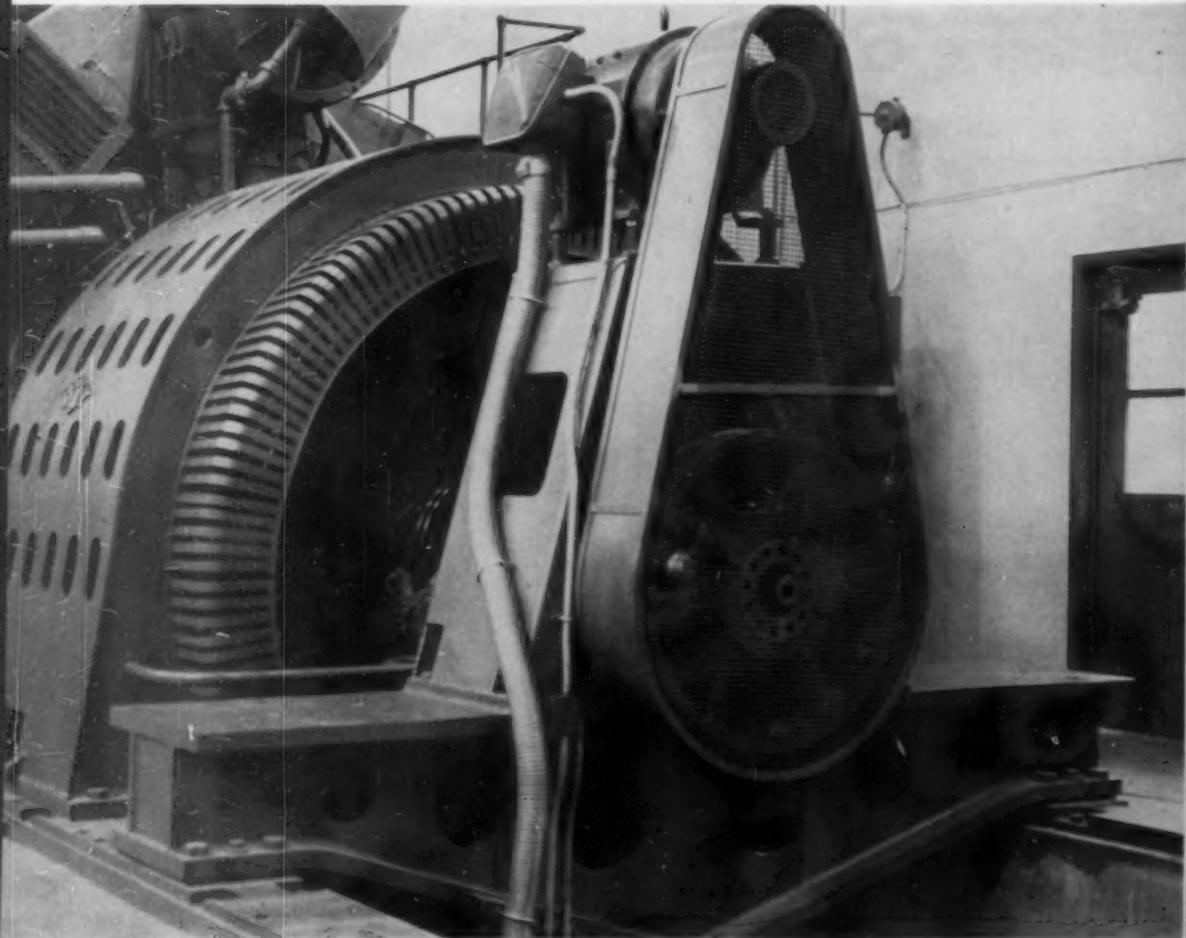
istration," Commander Larkin said. "We save an average \$1,000 a month over a year's time." Although Radio Jim Creek went into operation nearly five years ago as the world's most powerful radio transmitter, it wasn't until a year ago that provision was made for standby or emergency power. "Design specifications were pretty exacting," Mr. Charles D. Cummings, manager of Worthington Corporation's Seattle office said. "The type of generator and engine needed to supply the power to the transmitter called for unusual amounts of copper and engine power." The transmitter operates by carrier wave ON-OFF emission, commonly called CW. All messages are sent by Morse Code. The transmitter also uses frequency shift keying which operates radio teletypes. "This fluctuating power requirement means the generator must be capable of going from no load to full power about 3,000 times per minute—once every five cycles," Mr. Cummings explained.

The Worthington installation includes a 77-ton, 3600 hp, 16 cyl V type diesel engine. The cylinders are 14 in. in diameter. The stroke is 14 in., and the 14 in. diameter crankshaft turns at 450 rpm. The

generator rotor weight is 22 tons and the stator weighs 17 tons. "We've had no maintenance problems or serious breakdowns," Mr. R. Ross Nichols, head electrician at Jim Creek reported. "We run the generator once a week for check purposes and it has delivered all the power needed to operate the entire station. The engine uses an average of 75 to 80 gallons of fuel per hour."

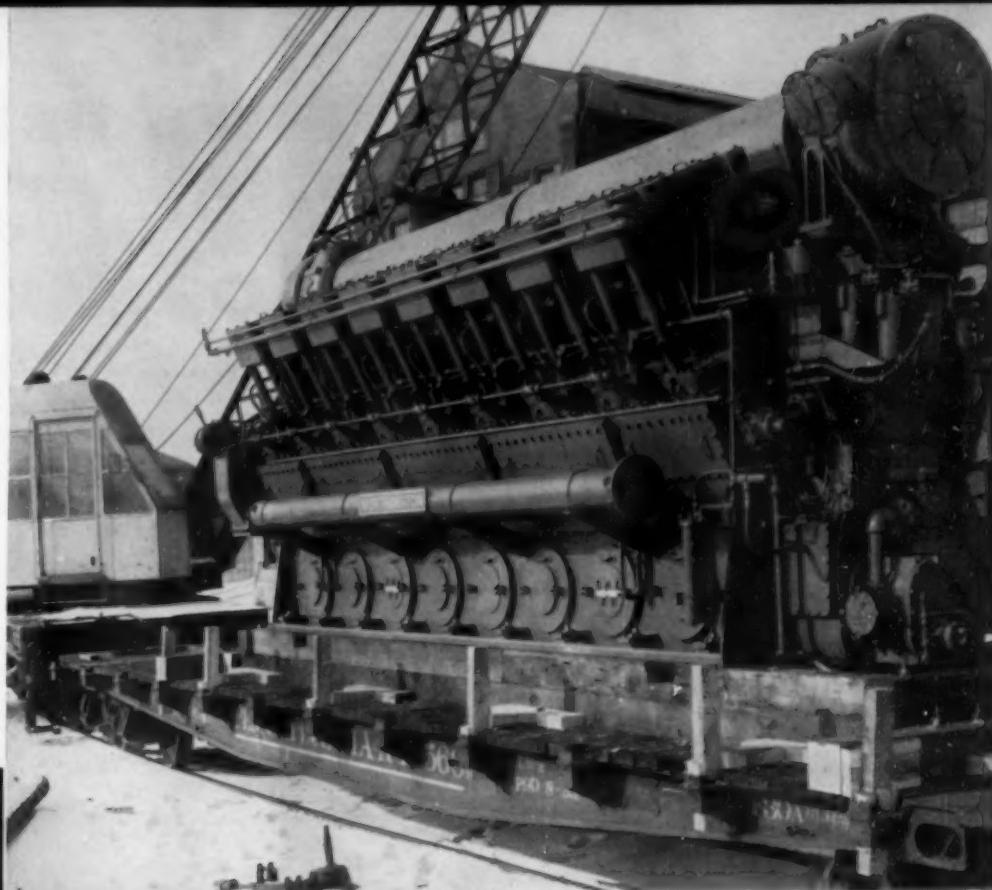
The big sixteen cylinder Worthington model SW-14 installed at Jim Creek Navy Radio Transmitter Station. The two men pictured from left to right are R. Ross Nichols, head electrician and A. J. Edson, electrician.

Electric Machinery generator and exciter driven by Worthington model SW-14 sixteen cylinder diesel built to operate as a dual fuel unit.



A large fan located in a separate room cools the liquid which circulates through the engine to maintain a constant temperature. Air going into the cylinders is also cooled to assist a maximum efficiency from the diesel fuel. An instrument panel provides data to assist the operator in maintenance and control. A check chart for entering performance information is maintained when the generator is in operation. "This Worthington standby generator probably has saved Navy communications personnel a lot of gray hairs," one of the Jim Creek men said. "Just a couple of weeks ago a bad windstorm knocked out our commercial power line. We started up the generator and it performed beautifully."

The self-supporting 200-ft antenna towers rest atop mountains 3000 feet in height. Six towers are on Blue Mountain to the south and the remaining six are on Wheeler Mountain to the north. Ten antenna spans in two groups of five each connect the towers across the mountains. The longest is 8900 ft and the shortest is 5800 ft. The



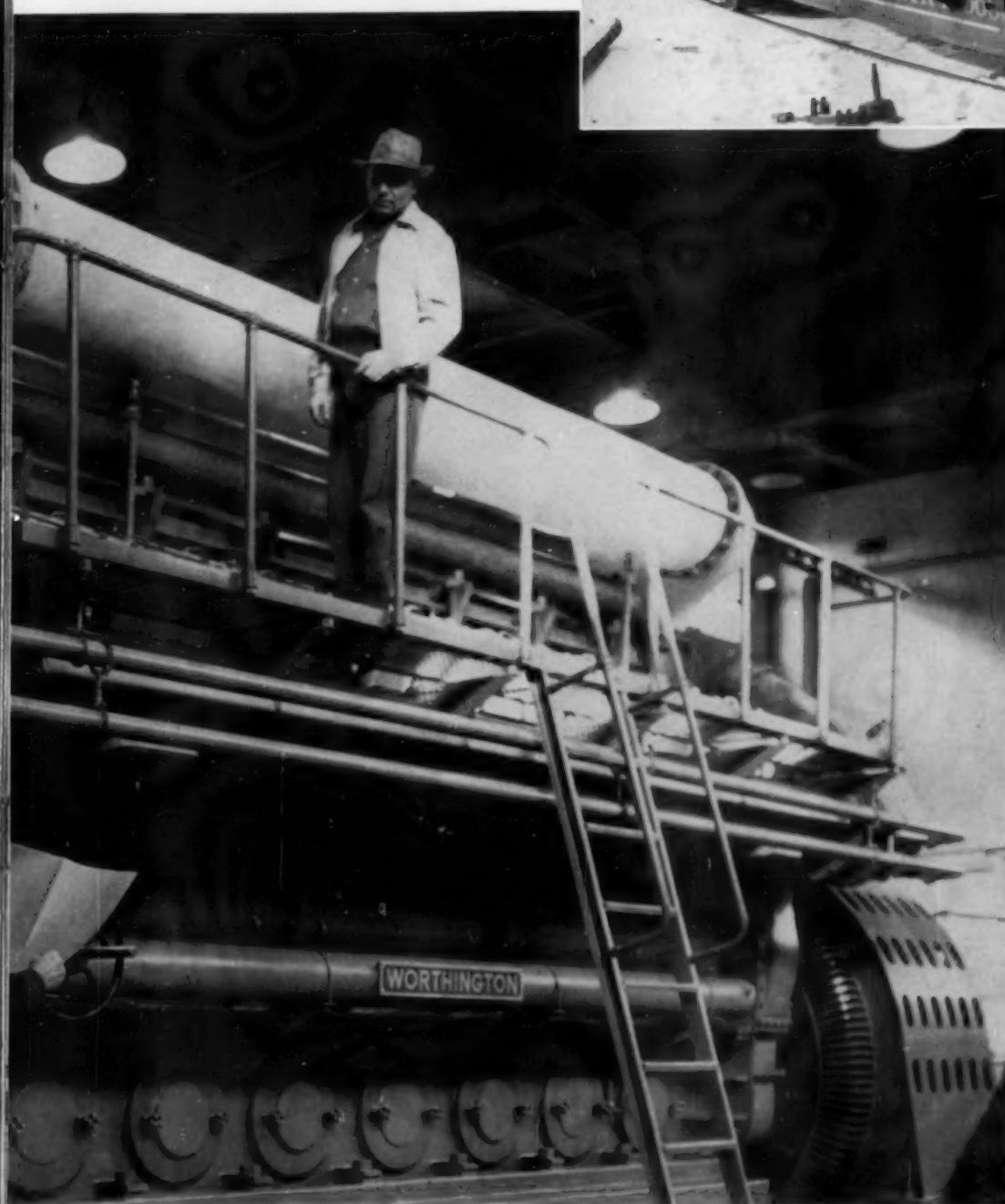
View of the Jim Creek engine outside the Worthington factory at Buffalo, N. Y. on the start of its journey to Oso, Wash.

average sag for the 10 spans is approximately 750 ft and the antenna downleads themselves are about 1500 ft. The ground return system consists of 300 miles of buried copper wire.

The Radio Corporation of America completed the building of the transmitter in 1953 at a cost of \$2,000,000. The cost of each power amplifying tube was \$10,400.

List of Equipment on the Worthington Diesel

Engine	Worthington type SW14-16 diesel derated to 3600 bhp at 450 rpm.
Generator	Electric Machinery 2500 kw, 80% p.f., 450 rpm, 3-60-4160 v. generator with a required voltage regulation at full load of not more than 11%, contrasted to standard regulation of 40%.
Exciter	Electric Machinery 1750 rpm exciter with Worthington Multi-Vee belt drive.
Switchgear	General Electric switchgear and transformer.
Heat Exchanger	Young horizontal radiator with 50 hp motor driven fan for cooling of engine jacket water.
Exhaust equipment	Maxim.
Lube oil filter	Hilco.
Air filter	Air-Maze.
Pyrometer	Alnor.



DRY TYPE AIR FILTER DEVELOPMENTS

By DOUGLAS SHEARING

CONSTANTLY keeping pace with the many recent new engine developments are new and improved products of all important accessories. Today's high output diesels are placing increasing demands on the efficiency and capacity of air filtration equipment. There has been a recent trend in the development of dry type air filters with replaceable elements for high speed diesels in trucking, construction equipment, etc. This dry type concept offers interesting possibilities and advantages in air filtration, particularly in handling large air flow requirements of turbocharged engines for example, and in providing a very high

cleaning efficiency over a wide range of engine operating conditions. The replaceable element features also offers the advantages of quick and easy changes, keeping down time as short as possible. Purolator Products has been doing intensive experimental and application work on an air filter of this type and have announced a line of heavy duty dry type air filters for diesel applications. These filters will be described along with typical applications to show their performance in the field under actual operating conditions.

Earlier models of the dry type Purolator air filter have been used in trucking applications in the midwest and east over the past few years, and with space and weight to be considered, the new filter element convolution or pleat depth has been increased to provide approximately 60% more area in the same envelope as the earlier models. This added dirt holding area, coupled with accompanying lower air velocities, have added substantially to air filter capacity and life. The microfine element of the filter is made of resin impregnated, convoluted cellulose. A line of four

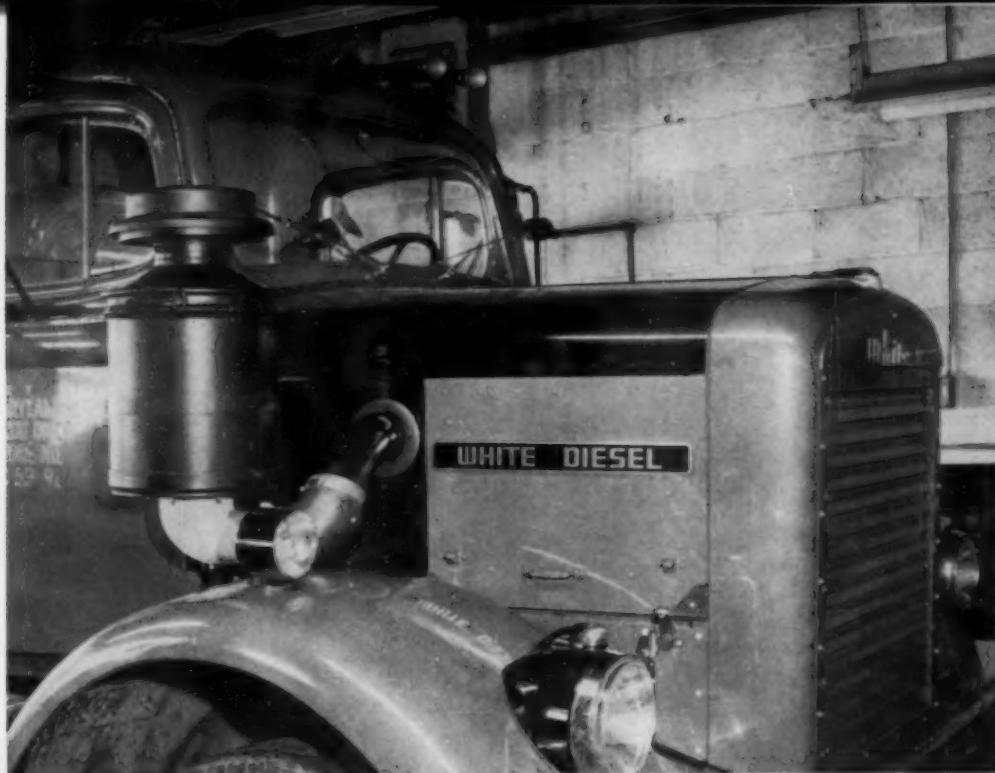
Ingersoll-Rand Drill Master rock drilling unit owned by York Drilling Co. Purolator two stage dry type air filters can be seen installed on the GM 6-71 diesel and the 600 cfm compressor. The engine air filter on this rig required no service for 590 hours with operation in a very dusty atmosphere.



Kenworth Model 953 truck designed especially for desert operation and powered with a Cummins NRT diesel, is equipped with two Purolator dry type air filters of the two stage type, with primary and secondary elements in series. These filters are mounted in duplex on right front fender.

basic filter element sizes incorporating this deep pleat idea have been developed to meet specific requirements of heavy duty diesel applications of all types. The high capacity of these new elements has led to a number of applications in highway trucking, as well as off-highway vehicles and construction equipment. Several applications and filter designs are illustrated and discussed below, with details of performance outlined.

The dry type air filter has been used on off-highway vehicles as an after cleaner because of its high



efficiencies at all engine speeds, but the installation on rock drilling equipment by the York Drilling Company of York, Pa., was one of the first where the dry type air filter was used independently of any other air filter for construction and off-highway equipment. On September 11, 1957, the first installation was made on an Ingersoll-Rand Drill Master rock drilling unit. Two Purolator dry type air filters were used: one on the 600 cfm compressor, and one on the 6-71 GM diesel powering the unit. The drilling rig is used for drilling blast holes and works constantly in a cloud of fine rock dust, similar to AC test dust. This particular filter is of two stage design, incorporating one primary and one secondary element in series. Where large volumes of contaminant are present, as in this case, it is frequently advisable to install the second stage to protect the air filter outlet while servicing the outer primary

element. Also, in one of the installations here, fibrous wraps were used around the primary elements. This fibrous wrap is most advantageous when excessive soot or oil vapors are encountered. These wraps were changed every 100 hours and increased the element life on the engine air filter by about 100 hours. When the air contaminant is primarily dry dust, the additional 100 hours of element life may be counteracted by the maintenance cost of changing fibrous wraps. Without the use of a fibrous wrap, the engine air filter on this unit required no service for 590 hours. It is also interesting to note that the element accumulated 18 lbs of contaminants prior to reaching 25 in. water maximum allowable restriction, whether or not the fibrous wrap was used. Servicing of this filter is simple and quick. The removal of three nuts allows the cover to be easily taken off, and by removing three additional nuts, the primary

Purolator heavy duty, single stage, dry type air filter installed on a 9000 White diesel truck equipped with a Cummins HF-6 diesel and owned by Maryland Transportation Co. Note the clean installation of this filter.

element and sealing plate are removed. The secondary or inner element will outlast 3 to 5 first stage primary elements but is easily replaced when it becomes clogged.

In a trucking application, Maryland Transportation Co. of Baltimore, Md., has installed Purolator dry type air filters on fourteen White 9000 trucks, which are equipped with Cummins HF-6 diesels. These filters have given over 25,000 miles service on an average without having maintenance of any kind. This filter is a single stage unit with top inlet, and bottom outlet. It is equipped with a rainhood, and the filter element is 10 in. in diameter and 12 in. in length and has a capacity of 516 cfm. This filter makes a clean installation on a truck and has even been installed under the hood on the new International Harvester ACD diesel truck models.

Another recent installation has been in large off-highway trucks to go into service in desert areas. These filters are of the two stage type, with primary and secondary elements in series. Two Purolator filters are mounted in duplex so that the trucks can make a round trip over desert country without intermediate service stops. These trucks are big, special design Kenworths equipped with Cummins turbocharged NRT diesels. This same air filter type is also being considered for applications in crawler tractors and other off-highway equipment.

To assist in determining when air filter elements need servicing, gages can be installed to indicate restriction to air flow through the air filter. These can be installed in a vehicle to flash a warning light when elements need to be changed or in a variety of maintenance setups for analyzing when filter elements need changing.

Disassembled view of the two stage Purolator air filter used on the Kenworth 953 truck for desert operation.



LAND DEVELOPMENT IN FLORIDA

By ED DENNIS



J. B. Fraser & Sons, Inc. 80 ft dredge operating at the Village of North Palm Beach. The model D397 series D turbocharged Caterpillar diesel engine was supplied by Shelley Tractor & Equipment Co.

MEN and machines carve canals to produce new Florida cities where once was only useless salt water mangroves. From Key West to Pensacola, Florida is growing up, she's a big state, underdeveloped, a pioneer peninsula, the land of Stephen Foster's Swanee River, a state where people are pouring in at a rapid pace to soak up its sunshine.

Florida's coastal salt water marshes and mangroves, which until recent years were vast wastelands, have become valuable tracts and are eagerly being sought by groups of land developers. All along the east and west coasts of the Sunshine state, dieselized dredges and draglines are grinding away piling up rock and fill from man made canals being cut through the low lying mangrove swamp, raising the land and creating miles of valuable canal and water front property some of which sell up to \$30,000 dollars a lot. Today, Florida is growing two and a half times faster than the rest of the nation. Since 1950 more motels and

hotels have been built in Florida than in the rest of the world put together plus over 5,000 new factories. Actually, Florida isn't booming, it's just naturally expanding. Instead of speculating in paper titles, the new settlers are paying cash and building homes and businesses. Investmentwise, Florida land, falls into about two classes, good high dry land and low lying swampy areas. Some of the most interesting land developments are taking place along these coastal swampy areas.

At Hallendale, on the Florida Gold Coast, H. B. Layne is building a multi-million dollar community from a salt water marsh along the Inter-coastal Waterway. When he started development of the property, it was an impenetrable 340 acre swamp so dismal it would even have terrified an alligator. Over 4,000,000 dollars has been spent in the first year and a half of dredging and digging.

Over 1,500,000 cu yds of hard coral was dug to raise the level of the land and to build the 120

foot wide canals. Four and a half miles of the broadest, non-commercial canals in the state have been built to date. All lagoons, waterways and turn basins must be dredged free of hidden obstructions to insure safe passage of pleasure craft. Golden Isles is a new community of unpretentious but extremely expensive homes which when finished will have a total of about 75 million dollars.

In March of this year, the firm, took delivery of the *Miss Golden Isle* a 60x20 foot dredge built by Dade Drydock in Miami. This \$250,000 dredge was acquired to accelerate the digging and filling operations. Powered by a D397 series D turbocharged Caterpillar diesel engine and Coker 2.04:1 reduction gears, the 14x12 Georgia Iron Works pump is able to move about 250 cu yds of fill an hour. The dredge also has a 187 kva Caterpillar diesel generating set plus a 6½ kw Petter generator unit for night operations. When it is completed the new, all waterfront, development will have a population estimated at 7,000 persons.

A few of the Allis Chalmers in use on the Cape Canal Project



As people and industry are flowing steadily into Florida's West Coast, it is creating a land boom which any day threatens to rival that of the lavish Gold Coast. This is Florida's up and coming area, a steady magnet for retirees, young couples and a raft of new industries. Along the shores of Charlotte Harbor, a few miles north of Punta Gorda, on Florida's West Coast, a fabulous city is taking form with the help of dredges and dozers.

A short time ago, the area was just palmetto and ranch land. The new city will be called Port Charlotte and with about 90,000 acres to sprawl in it is just about the largest and most ambitious land development project ever undertaken in the State of Florida. One hundred and fifty square miles is the size of the project. And the area extends along the Tamiami Trail (US 41) for a distance of 14 miles. The Mackle Company, one of the largest in the U. S., is developing this subdivision and it is estimated the area will finally contain some 270,000 housing units and one third of the area will be used for streets, public buildings, shopping centers and sewage disposal plants.

Caterpillar diesized Bucyrus-Erie draglines have excavated about 8 miles of canals to date. Canal specifications call for digging approximately 14 feet with 110 foot lip and 60 foot bottom, to allow for 6 feet of water at mean low tide. International TD18 dozers with Rome discs and Caterpillar D7's with Fleco rock rakes handle the trees and the palmetto palms and do much of the clearing and grubbing. Construction of the streets and roads were handled by Hubert-Warco 5-D-190 motor graders powered with General Motors 6-71 die-

sel engines and are basically of the chip rock type with marl sub-base, lime rock base and chip rock surface, which is standard Florida practice.

Where land leveling was needed the job was subcontracted to A. P. Frizzle Construction Co. who worked three S-7 Euclid scrapers. These General Motors diesized scrapers were moving 12 to 1500 cu yds of material a day. An Allis-Chalmers HD20 dozer was used to pushload on this phase of the project. Much of this newly developed land will be sold to persons retiring from up north and moving to Florida. The Federal Government estimates one out of every five persons retiring in the U. S. is moving to Florida. Up at West Palm Beach diesized dredges are grinding away in a 4,200 acre tract of sawgrass and swamp in the first phase of the construction of a city within a city. The 350 million dollar project is expected, over a seven year period, to add 10,000 new homes and provide several large industrial areas. Westward

Three D9 Caterpillar tractors working as a team and pushing 65 to 70 cu yds of rock and sand at each pass. Barny Walden of Princeton, Florida is developing thousands of acres of South Florida property with these tractors.



Developers Inc., the company developing the tract, estimates that the dredging operation will cost in the neighborhood of 5 million dollars.

In the Clearwater area, once useless and uninhabited mangrove islands and submerged land is now rapidly being converted to home sites and valuable business property by dieselized dredges.

The North Bay Company officials estimate that the job will take 5 to 6 years to complete. A herculean task is in the making for dredging operations alone called for pumping over $3\frac{1}{2}$ million cubic yards of material from the bottom of Clearwater Bay. A half-million dollar sanitary sewerage disposal plant is also being built on this new property.

Hundreds of pieces of dieselized construction equipment will be needed on these and other land developing projects being dreamed up as there is more to it than merely having a bulldozer clear some land and putting in lot stakes.

Recently the Crabtree Construction Co. of West Palm Beach received a contract to pave 950 miles of streets in Lehigh Acrea a newly planned subdivision near Fort Myers. This is the largest single road construction job ever recorded. With the further development of the flood control project, widening of canals and the improvement of drainage systems, the flood criteria will be lowered in many low swampy areas. This will make additional land available for development and increase the values of once worthless marginal land.

Above is a D7 Caterpillar tractor equipped with a Fleco rock rake and rubber tired compaction roller used on the land clearing and grubbing job at Port Charlotte. Below—Allis-Chalmers dieselized equipment reigned supreme on the Cape Coral land project. Three #160 tractors and 9.5 scrapers with 135 hp Allis-Chalmers diesels, a #45 road grader, two HD20 tractors, one HD6 tractor and one HD16 tractor; all the tractors were equipped with Twin Disc hydraulic torque converter drive. Square Deal Equipment of Orlando supplied the Allis-Chalmers dieselized machinery on this job.



DIESEL PROGRESS

NEW YORK'S FINEST FIREBOAT THE REBUILT JOHN J. HARVEY

With Five New Fairbanks-Morse Opposed-Piston Diesels, the 27-Year-Old Vessel Becomes the Fastest, Most Flexible Fire Fighter in Fleet

By DOUGLAS SHEARING

A RENOVATION program featuring installation of five new diesel engines has transformed the 27-year-old Fireboat *John J. Harvey* into the most effective fire fighter in New York's eight-vessel fleet. The ideal fireboat is versatile and flexible. It has speed to get to the fire in a hurry, power to tow a burning ship or barge, pump capacity to pour a flood of water on the blaze, and

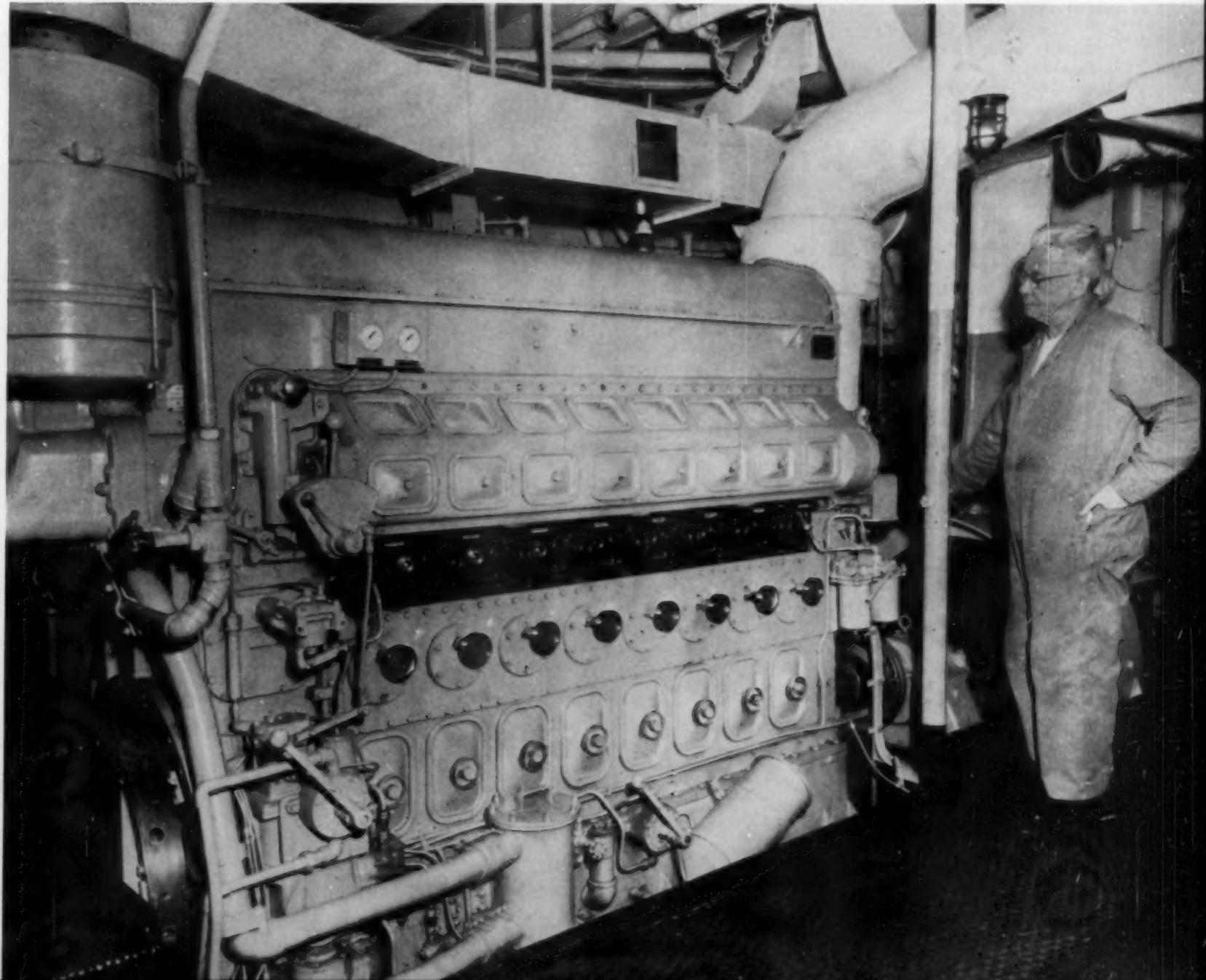
ability to maneuver while pumping. The *John J. Harvey* has all these attributes—a top speed of 19 knots, diesels totaling 3,000 horsepower, pump capacity near 20,000 gals. per minute, and ability to move at 10 knots with all pumps in service.

The *Harvey* came out of the Todd yards in Brooklyn in 1931 with five gasoline engines to power her

pumps and propulsion motors. Originally rated at 565 hp at 1150 rpm, the engines yielded less after a quarter century and required extensive maintenance, limited the availability of the vessel. Also, the 6,000 gals. of gasoline on board were a constant worry despite a system to control explosive vapors. Since the welded steel hull was sound and much of the vessel's equipment good

One of the new F-M diesels on the *Harvey* is inspected by Chief Engineer William Burns who has served on this vessel since she first went into service in 1931. The new diesels have increased the *Harvey*'s speed 37% and pumping capacity 20%.

39



for another quarter century of service, it was decided by Fire Commissioner Edward F. Cavanagh, Jr. and his engineering aides to renovate the *Harvey*. The objective was not merely to restore the vessel but to modernize her and build in the fire fighting potential of the best new fireboats.

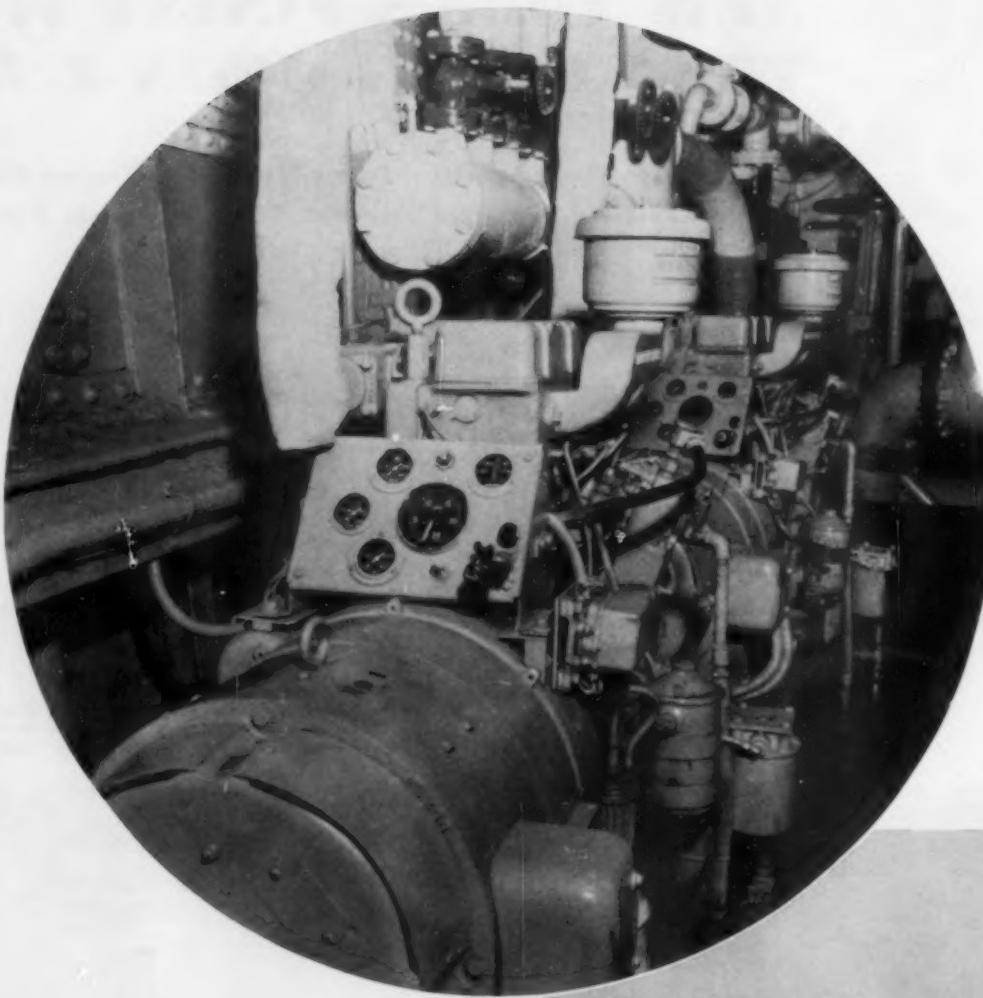
Plans were drawn by Gielow-Inc., naval architects, and in 1957 the *Harvey* went into the Camden, New Jersey, yards of the RTC Shipbuilding Corp.

Heart of the project was the installation of five new Fairbanks-Morse opposed-piston diesels. Each of these identical units is a model 38FS5½ of 8 cylinder, 5½-in. bore and 7½-in. stroke, rated at 600 hp at 1200 rpm, giving the vessel a total of 3,000 hp. These compact heavy-duty diesels are mounted on the same foundations occupied by the gasoline units with one pair of engines lined up fore and aft on the port side of the engine room, another pair on the starboard side, and the fifth diesel between the two after engines.

All five of the engines can provide power for propulsion of this diesel-electric fireboat, while four of the five diesels also power the pumps. The four dual-purpose units have double extended shafts, driving on one end a 340 kw, 250 volt, Westinghouse dc generator which was part of the vessel's original equipment. On the other end, each of these engines drives one of the original LeCourtney two-stage centrifugal pumps (with 12-in. suction and 10-in. discharge) through a new Falk Airflex clutch. The fifth diesel drives a double-unit generator with each unit rated at 170 kilowatt.

The *Harvey* is a twin-screw vessel, 130 ft in length overall, 28 ft beam, 9 ft draft, a net tonnage of 182 tons and gross of 268 tons. Each Columbian bronze propeller has a 72-in. diameter and 52-in. pitch and is driven by a 1065 hp, 625 volt Westinghouse propulsion motor. Each motor draws electric power from the two generators on its side of the boat while the center split generator can supply either or both motors. This arrangement helps make the *Harvey* highly maneuverable and insures ample propulsion power.

Though the original pumps and propulsion motors were retained, the new diesels substantially improved the performance and capacity of the fireboat. Each pump was rated at 4,000 gpm at a 150 lb discharge pressure at 1150 rpm. The new engines turn over a little faster and make more power available and the result is more water and pressure at the monitors. Engineers on board report that previously the pumps could discharge at 150 lbs with three 2-in. nozzles in service. In a test of the new power units, pressure was up to 180 lbs for the same service. At a discharge pressure of 160 lbs, the four pumps handled a combined volume of 18,500 gpm. Instead of a total capacity of 16,000 gpm at 150 lbs, the *Harvey* can deliver nearly 20,000 gpm at the same pressure. Two pumps can be operated in series to provide half the volume at twice the pressure. Greater power has meant more speed, too. Previously, the gasoline-powered boat could do no more than 13.6 knots. On the trip back to New York from Camden, the new diesels pushed the vessel to an impressive 19 knots.



Auxiliary power is supplied while the *Harvey* is in service by a new pair of model 45C4½ Fairbanks-Morse diesel-generator sets.

Probably more important than either single improvement is the combination of the two. Greater power means that the *Harvey* can pump and maneuver at the same time. With all four pumps operating at capacity, the fireboat still can make 10 knots, insuring power for towing and maneuver. Top speed through the water is important, of course, only in getting to a fire, before pumps are put into service.

In many other ways, the new *Harvey* is a better fireboat. A Decca radar set enables the pilot to guide her safely, surely and swiftly to her job even through darkness, fog or smoke. The pilot house also is equipped with a Motorola two-way radio, a Sperry electric steering unit, and Cory controls for engine and pumps. There are two new 750,000 candle-power searchlights. A new 1-ton hydraulic crane is used in launching a lifeboat and the flat-bottomed punts for fighting fires under the piers.

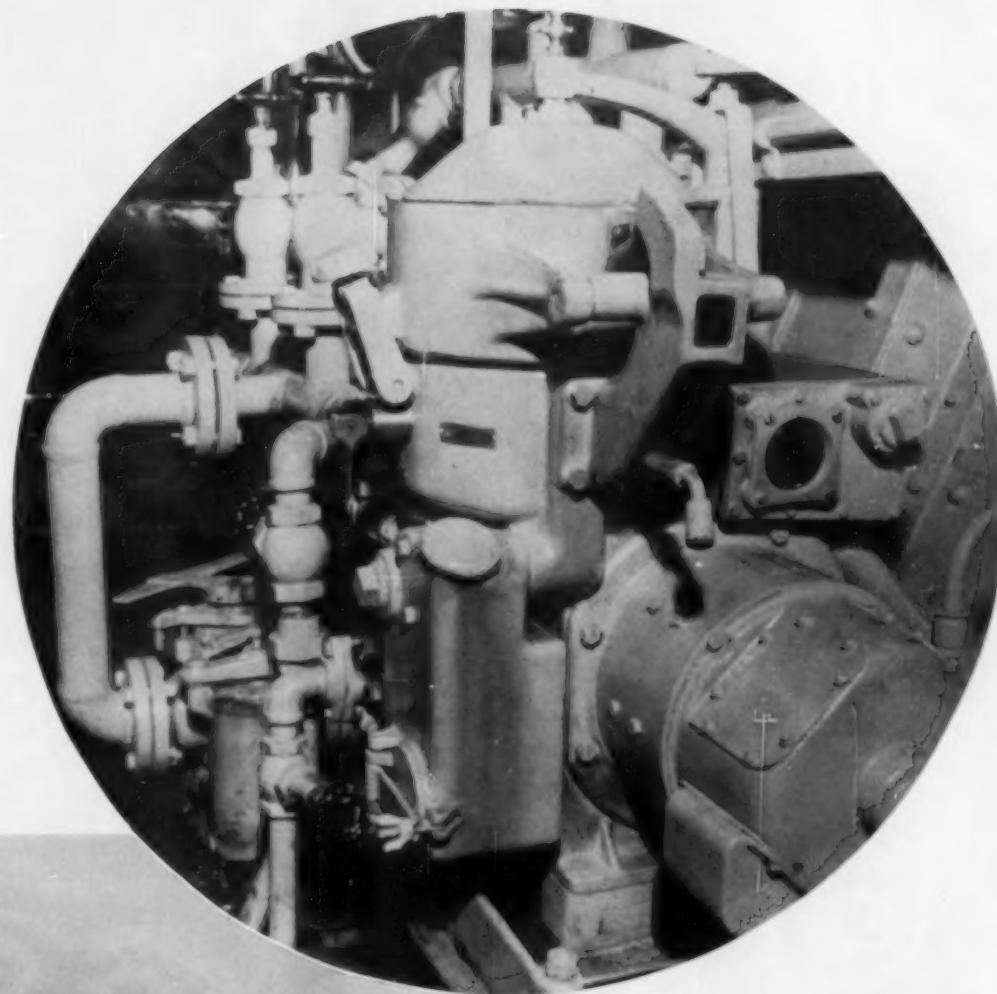
The new *Harvey* can work long and hard without refueling. Previously, the gasoline engines consumed 250 gallons of fuel an hour, exhausting the supply in 24 hours. The new tanks for diesel fuel have a capacity of 7,860 gal. and the five Fairbanks-Morse diesels at full load use no more than 150 gal. an hour. This means that the *Harvey* can



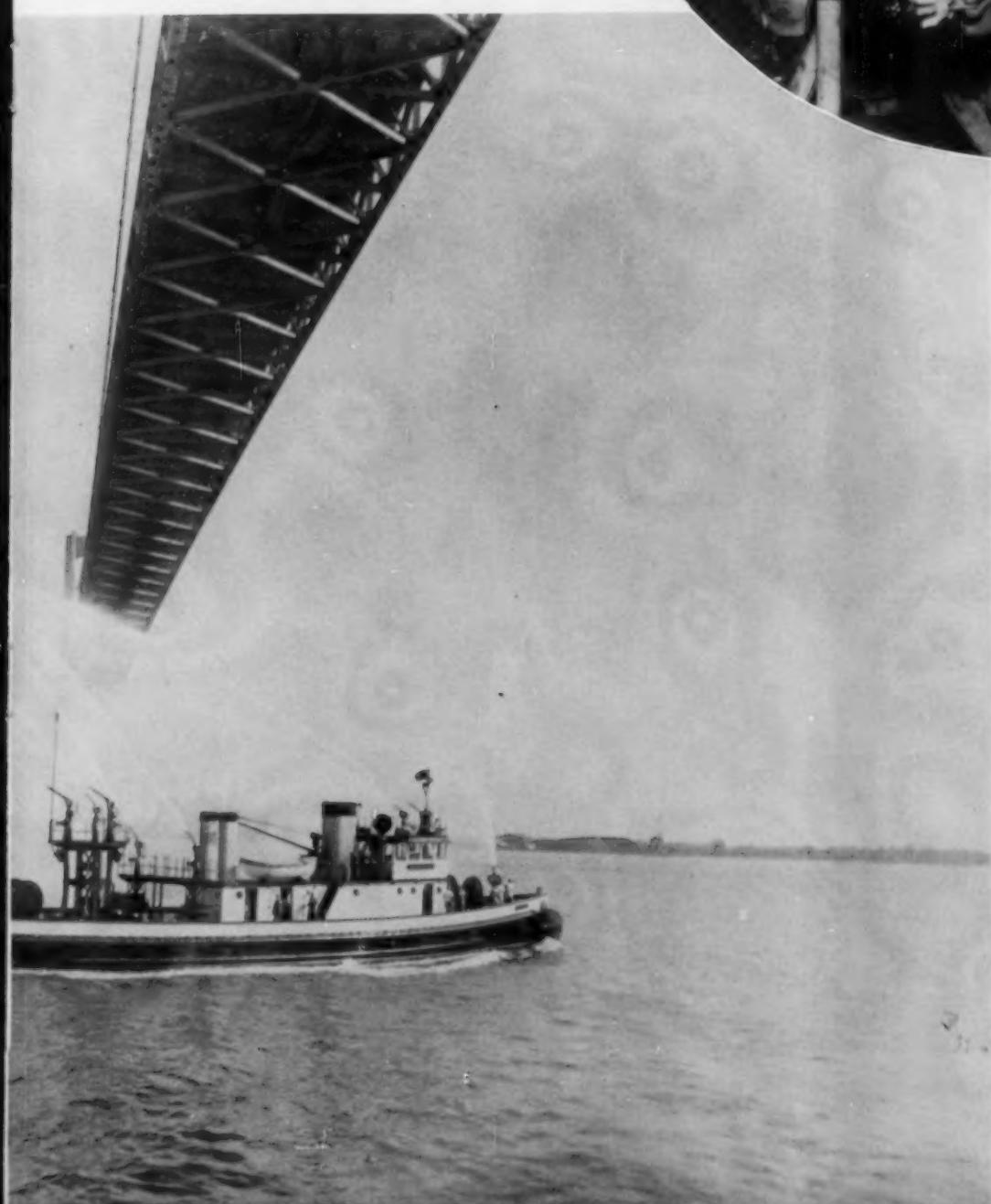
work continuously at capacity for more than two days without refueling. Though fuel economy is not the deciding factor in choosing a prime mover for a fire fighter, it is a welcome bonus. There are two 2,000-gal. bunkerage tanks in the forward compartment. From these tanks, fuel oil is put through a DeLaval centrifuge to the after clean oil tank, and then pumped as required to the day tanks in the engine room.

The engines are self-sufficient package units with Woodward governors, Air Maze air filters and lube strainers, Purolator oil filters, Ross oil coolers, and jacket water heat exchangers, U. S. pressure gauges and Weston thermometers all mounted right on the engine. Exhaust gases vent through Maxim silencers. One of the few changes in the superstructure was a pair of new stacks.

When the *Harvey* went diesel, the switch was complete. Into the engine room went a new pair of Fairbanks-Morse diesel-generator sets to provide lighting and auxiliary power. Each set includes a model 45C4½ two-cyl diesel rated at 24 hp driving a 15 kw dc generator. When the vessel is tied up at the pier, a shore connection is used to supply auxiliary power.



Diesel fuel from the forward bunkerage tanks is put through this DeLaval centrifuge and stored in the after clean oil tanks.



The *Harvey* is manned around the clock with a master-pilot, three marine engineers and six deck firemen on duty at all times. These men must combine the experience and the skills of fire fighters and mariners. Except for major overhauls, they handle all maintenance on their boat and equipment. Often they are called on to do rescue work in the harbor. Always, they occupy a proud and colorful place in harbor welcomes. But their main job is fire-fighting and they never forget it—whether it is to tow a burning barge, deluge a dangerous river-side conflagration, or slide under a burning, smoke-filled pier.

The men of 86 Engine Company know that today they have a highly efficient piece of equipment to work with, the equivalent of 20 or more land pumper. Conversion to diesel power has given the fireboat *John J. Harvey* a 37 percent gain in speed, a 20 percent gain in pumping capacity, greater maneuverability, greater fuel economy, reduced maintenance, and longer service without refueling. All this has been achieved at a cost of about \$400,000, a million dollars less than the last new fireboat cost the city. Most important, it has given New York improved fire protection in the greatest harbor in the world.

M/V REEDY POINT

By W. L. BODE

THE tugboat *Reedy Point*—to be the most powerful harbor tug in the Philadelphia area—was commissioned recently in colorful ceremonies at the Berkley Plant of the Norfolk Shipbuilding and Drydock Corporation for The Curtis Bay Towing Company. Mrs. J. Hoge Tyler III, of Norfolk, broke the traditional bottle of champagne over the bow of the 2400-horsepower vessel as music was played by the Second Marine Aircraft Wing Band, of Cherry Point, N. C. At the conclusion of the affair—attended by prominent officers of the Marine Corps and Coast Guard as well as leading industrialists of the Hampton Roads area, the guests were entertained at a reception and buffet luncheon at the Princess Anne Country Club, Virginia Beach. The Seaboard Citizens National Bank, of Norfolk, was host. The *Reedy Point*, designed to the specifications of the Curtis Bay Towing Company by Harry W. Keeling, Jr., Naval Architect, will be sent to Philadelphia for operation within the next ten days, as soon as the final details have been completed. The tugboat not only is the largest harbor tug to operate in the Delaware River Valley area, but also is the largest commercial tug built in the Hampton Roads area.

The *Reedy Point* will join the *Kings Point* and *Fells Point*, which have been in service in Curtis Bay's fleet of 35 tugs for over a year. All three are powered by 16-cylinder Alco diesels, and they rank as the most powerful commercial harbor tugboats in the United States. The Alco Products, Inc. Vee-type model 251-B engine aboard the *Reedy Point* is a turbosupercharged unit rated at 2100-hp at 1000 rpm for continuous duty and 2400-hp in emergency operation. The engine has 9" x 10½" bore and stroke, is 31 feet long and weighs approximately 43,500 lbs dry. Curtis Bay's original experience with Alco Products, Inc. diesel engines was in the tug *Cavalier*, which carries two Alco model 539, 900-hp units installed in 1955. Those engines are in their third vessel, having seen prior service in the tug *Peerless* and a Navy net tender. The *Reedy Point*'s diesel is equipped with an insulated exhaust manifold, two (2) Quincy air compressors providing air motor starting system, and a Woodward "P.G." governor operated by Westinghouse Air Brake Company pneumatic controls. Control stations for the engine are located in the pilot house and on the after end of the boat deck so that the boat can be controlled completely from either station. The engine turns a bronze propeller and has a cradle-type O.B. bearing and a stub shaft to connect through a Falk Airflex coupling to the Hindmarch-DeLaval reverse-reduction gear.

The reverse-reduction gear has an input speed of 1,000 rpm and output to the propeller of 250 rpm. The gear has oil-operated clutches and a Kingsbury thrust bearing. The engine's turbosupercharger, designed and manufactured by Alco Prod-



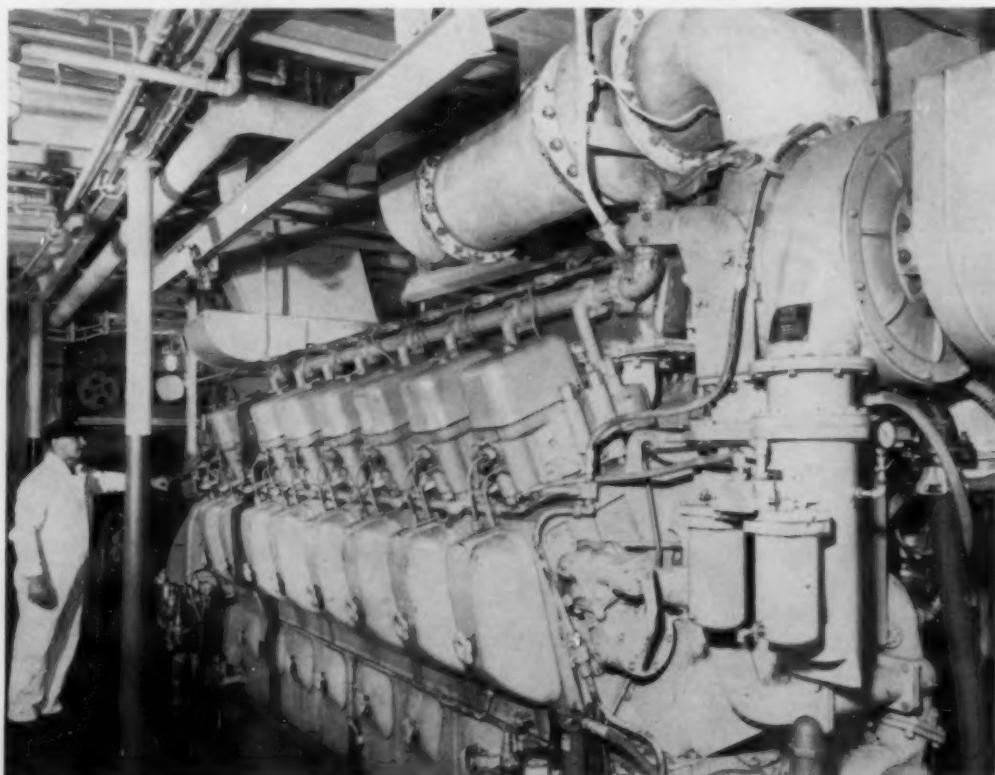
The *Reedy Point* is 97'8" x 26'12", powered with a 2100 hp Alco turbocharged diesel.

ucts, Inc., is identical with units boosting the output of engines that drive Alco diesel-electric locomotives. Auxiliary power for the tugboat is provided by two (2) G.M. Series 71, 3 cylinder diesel generator sets equipped with 40 kw, dc Delco generators.

The *Reedy Point* has been designed for high serviceability and efficiency and its full lines will enable it to handle the large modern bulk carriers and all other vessels with the fullest utilization of

its power and steerage. She has the ability to go to sea, should the need arise and is self sustaining for approximately twenty (20) days. The most modern engineering practices were used in its construction at the Norfolk Shipbuilding and Drydock Corporation, and machinery has been provided ample space for access and repair. The *Reedy Point* gets its power from a 16-cylinder model 251 turbocharged Alco diesel engine. The new tug's engine is identical to this one, now powering Curtis Bay's tugboat *Kings Point*.

The *Reedy Point* gets its power from a 16-cylinder model 251 turbocharged Alco diesel engine. The new tug's engine is identical to this one, now powering Curtis Bay's tugboat *Kings Point*.



DIESEL PROGRESS NAMES NEW MANAGING EDITOR; OPENS EDITORIAL AND SALES HEADQUARTERS IN MILWAUKEE

As part of its continuing program to better serve users and manufacturers of power equipment, DIESEL AND GAS TURBINE PROGRESS has announced the appointment of Robert E. Schulz as Managing Editor and the establishment of new editorial and sales headquarters in Milwaukee, Wisconsin. In making this announcement, Rex W. Wadman, Editor and Publisher, cites the steady growth of the publication in the Industry, its expanding coverage of markets and the need for more centralized offices as key

PHB in Journalism, Bob Schulz joined Nordberg Manufacturing Company in its Publicity Department, and later he was placed in charge of all editorial service with the business press. In this capacity he travelled extensively, covering all major market applications of Nordberg engines. In 1953 he was named Manager of the Company's advertising and Sales Development Department, a position he retained until joining DIESEL PROGRESS. He is a past president of the Wisconsin Industrial Editors Association and is currently President, Milwaukee Chapter, National Industrial Advertisers Association.

In this new position as Managing Editor, Bob Schulz will headquartered at the publication's new, modern offices in the Equitable Life Insurance Co. Building at 1701 West Wisconsin Avenue, Milwaukee 3, Wisconsin. Also located in these new offices is Bruce W. Wadman, Executive Vice-President of the publication, who will be in charge of Advertising Sales and Circulation. Bruce Wad-

man, son of the Publisher, has been associated with DIESEL PROGRESS since 1952 and has served in several different capacities during this time, mostly in the Midwest area.

DIESEL PROGRESS will also expand its authoritative marketing service to manufacturers in these new offices. Rex W. Wadman notes further that the Industry is undergoing a period of transition in many markets. Renewed vigor must be imparted by the Industry to reach and develop new markets and strengthen the Industry's position in existing spheres of application. He has pledged the publication's wholehearted support in this endeavor. The readers of DIESEL PROGRESS are cordially invited to contact Bob Schulz or Bruce Wadman at the new Milwaukee Headquarters whenever they can be of service. Many of the magazine readers have new or unique applications of diesel engines that would make excellent stories. The editors are always very anxious to hear about them.



Robert E. Schulz, new Managing Editor.

Editorial and Sales Headquarters for DIESEL PROGRESS are now located in the Equitable Building, 1701 W. Wisconsin Ave., Milwaukee 3, Wisconsin.



factors in the opening of these new headquarters. Executive offices will be retained in Los Angeles, California.

Mr. Schulz brings to the editorial staff of the publication a sound background in the Diesel Industry together with many years of experience in the editing profession. A native of Wisconsin, Bob Schulz was early associated with his father in the automotive electrical business. In 1943 he joined the U.S. Army Air Corps and was trained in aerial photography and later as a B-29 flight engineer. Following his honorable discharge from service in 1945, he attended Carroll College for two years, and during this time he was editor of the weekly newspaper and handled special public relations for the school. In 1948, prior to attending Marquette University, he was Sports and Feature Editor for the Waukesha Daily Freeman. Graduating from Marquette in 1950 with a

TRUCKERS REPORT ON VOLVO-DIESEL TESTS

By JAMES JOSEPH

SWEDEN'S Volvo diesel is making a strong bid as replacement for gasoline truck engines in the 90 to 185 hp range. Last month six western truckers, job-testing Volvo L-375 tractors (installed with Volvo D-47, 90 hp diesel engines), handed in their reports. The consensus: mileage-wise, it was Volvo—all the way.

Big Ringsby Truck Lines, Inc., test-ran its Volvo diesized rig for ten days, reported an average 8.87 mpg in pick up and delivery service. Asbury System's test-rig showed a 76 per cent increase in miles-per-gallon as opposed to the gasoline engine tractor it replaced. The Volvo averaged 8.45 mpg, compared to 4.8 mpg for the gasoline-powered rig. In a 37-day road-test, Navajo Freight Lines, Inc., found that its Volvo-rig averaged 8.66 mpg, a savings of some 2.34 cents per mile over tractors with gas engines.

Fisk Trucking & Transfer Co. ran its Volvo rig Los Angeles to San Francisco, a route it had previ-

ously assigned to a 145 hp gasoline-powered tractor and trailer (gross weight varied between 26,000-40,000 pounds). The Volvo got 9½ mpg (compared to just 6½ mpg for the higher-powered gasoline rig). Yet significantly, Fisk found that the Volvo's power and ability to handle the load was about the same as the gasoline tractor's or perhaps a little better. All of which tabs Volvo as a comer in competition between diesel-and-gas power. "Frankly," says Pete Avrea, who heads Volvo engine sales in the 11 western states, "we're out to repower a lot of gasoline rigs."

Volvo's replacement aims are keyed to three engines and their trucks: (1) Volvo L-375 medium-weight truck powered by a direct-injection Volvo D-47 which develops 90 hp at 2800 rpm; (2) Volvo L-385 light-heavy-weight rig powered by a Volvo D-67, 115 hp at 2400 rpm diesel engines; (3) Volvo L-395 heavyweight, installed with either the Volvo D-96, 150 hp at 2200 rpm or the TD-96, the same engine with turbocharger, which is rated 185 hp.

All three engines are 6-cylinder. All are direct-injection type. Torodial chambers, machined in each piston's crown, create a turbulence which thoroughly mixes atomized fuel with air. Volvo claims the torodial chamber is the reason for its engines' better-than-gasoline mileage.

Another oddity: the absence of exhaust stacks. Volvo says they're not necessary because the engines burn clean. Nearly smokeless operation is attributed both to direct-injection combustion and to the engines' internal balance. During manufacture, most parts are balanced statically as well as dynamically. This better balance—plus the use of viscous-type vibration dampeners—led most test drivers to comment favorably on the rigs' handling. Ringsby's driver, for example, found that the performance of the light-weight, lower horsepower Volvo, 90 hp, compares favorably with the gasoline powered truck he was driving, and it was rated in excess of 200 bhp.

Volvo, incidentally, backs up its claim of lower maintenance costs with a 30,000-mile parts-labor warranty on its trucks, a 30,000-mile or 6 months guarantee on their engines. It goes so far as to pick up most of the labor-materials tab during an engine's first year or 100,000 miles. Most comprehensive run-test was Navajo Freight Lines' 37-day trial, which indicated a 2.34 cents per mile savings over comparable gasoline-powered rigs.

In a 37-day road-test, Navajo Freight Lines, Inc. found that its Volvo-rig averaged 8.66 mpg, a savings of some 2.34 cents per mile over tractors with gas engines.



Navajo test-rig compilation: Vehicle traveled a total 4,661 miles and consumed 538 gallons of diesel fuel. It picked-up and delivered a total 627,748-lbs of freight. Daily it averaged, over the 37-day test 125 miles. Average daily diesel fuel consumption came to 14½-gallons supplied by Standard Oil Company of California. Average daily load amounted to 16,885-lbs. Vehicle weight averaged 29,288-lbs; tractor pulled boxes ranging from 22 to 35-feet. Average miles per gallon: 8.66.

A. J. Eyraud, president of Asbury System, reported that he'd assigned the Volvo to their pickup fleet, and it showed remarkable fuel savings, coupled with a general all-around satisfactory performance. Particularly interesting are Asbury's test statistics because the Volvo, during the 30-day Asbury test, operated in heavy metropolitan-Los Angeles congestion.

Asbury's findings: Miles traveled, 3171; Average Miles per Day, 106; Fuel consumed, 375-gallons; Average mpg (Volvo), 8.45; Average mpg (gasoline rig over same run), 4.8; Average daily consumption, 12.5-gallons; Tonnage picked-up and delivered, 606,871-lbs; Average daily net load, 10,115-lbs; Fuel cost per mile (gasoline unit), .051-cents; Fuel cost per mile (Volvo L-375), .026-cents; Fuel cost per mile saved, .025-cents; Miles-per-gallon increase diesel vs gas, 3.65-miles.

All three models of Volvo truck engines, introduced on the west coast only within the past few months, are distributed by Auto Imports, Inc.,

Texas Arizona Motor Freight, Inc., is also testing the Volvo L-375 tractor (seen here), which is powered by Volvo D-47 diesel engine.

Sherman Oaks, California. Dealer for California, Arizona, New Mexico and Nevada is J. T. Jenkins Co., which operates five sales-service branches. Sweden's AB Volvo Co., though better known in the U.S. for its sports car, has since 1927 manufactured a world-wide line of diesel and gasoline industrial-marine-transport engines. Additionally, it manufactures in its plant at Gothenburg a complete line of buses, trucks, tractors, road graders and more recently, has brought out a jet aircraft engine.

Volvo diesel truck engines: The 90 hp D-47 direct-injection, overhead valve engine, has 6 cylinders, a bore of 3.75-inches, stroke of 4.32-inches, 17:1 compression ratio, a piston displacement of 290 cu in. and a torque of 203 lb ft at 1400 rpm. It is cooled by a radiator, 4-bladed fan and centrifugal pump. Pressure lubrication feeds all bearings, gudgeon pins, valve mechanisms and timing gears. Inlet valves are nickel-steel; outlet valves, chrome-nickel alloy-steel with stellite-coated seats.

The 115 hp D-67 engine has a bore of 4.12-inches, a stroke of 5.12-inches, 17:1 compression ratio, piston displacement of 410 cu in. and a maximum torque of 290 lb ft at 1200 rpm. Engine is fitted with a high-pressure fuel injection pump, the English C.A.V., with a diaphragm-sealed feed pump of the plunger type. The feed pump, which is driven from the pump camshaft, is fitted with a hand primer pump.

The non-turbocharged 150 hp D-96 has a bore of 4.75-inches a stroke of 5.5-inches, a 17:1 compression ratio, a piston displacement of 592 cu in. and its maximum torque is rated 427 lb ft at 1100 rpm. Like the D-67 (but unlike the D-47), its cylinder liners are the wet-type. Cooling is by a tube and fin radiator. Two large fuel filters between the fuel feed and injection pumps assure cleansing. The filter nearest the injection pump is sealed. Its purpose, aside from its normal function, is to doubly-

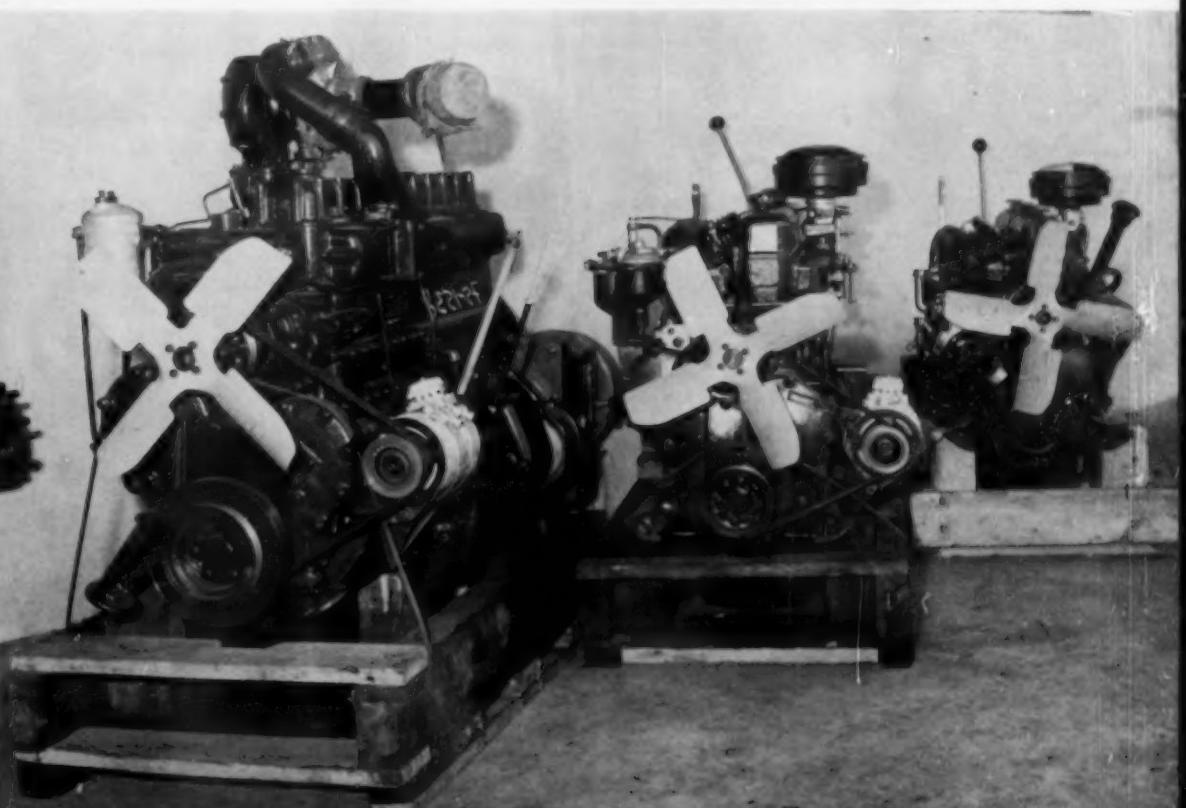


California Cartage Co., Inc., is still another over-the-road hauler currently test-running a Volvo L-375 tractor and D-47 engine.

protect the injection unit from any system impurities during those periods when the main filter is being cleaned. Additionally, individual filters protect each injector head. The 185 hp TD-96 is similar to the D-96, except that it is turbocharged (max. torque is 533 ft lbs at 1000 rpm). Though Swedish engineered and built, Volvo diesels carry a goodly share of United States, British and German equipment.

Direct injection systems on the D-47 and D-96 are German Bosch, the D-67's is C.A.V., Bendix-Westinghouse furnishes braking-air compressors. Most Volvo trucks imported to the U.S. are installed with Ross steering and Eaton axles. Now, with test-fleet data in and more accumulating day-to-day, Volvo diesels—both engines and trucks—may well become major contenders in the "big switch"; the repowering of gasoline-engined rigs with diesel engines.

Volvo's three diesel truck engines: left to right, (1) the 185 hp, turbocharged TD-96; (2) 115 hp D-67 and (3) 90 hp, D-47.





WHAT'S GOING ON IN ENGLAND

CONDUCTED BY BERNARD W. LANSDOWNE

Bernard W. Lansdowne is an associate member of the Institution of Mechanical Engineers and is widely known among British and European diesel manufacturers as a former editor of our English contemporary "Gas & Oil Power." His early workshop training was spread over seven years with A.E.C. Ltd., Southall, following which he served some five years with that company's sales engineering department. He is now specializing in industrial advertising with Roles & Parker, Ltd. in London.

The Dual Fuel Mirrlees Design

The familiar Mirrlees K type engine of 15 in. bore by 18 in. stroke was first envisaged as long ago as 1947, and from its inception Mirrlees designers intended that it would be capable of operation on any contemporary fuel. These include both light and heavy grades of oil, dual-fuel and spark ignited gas. The latest phase in the development of this design was commenced in 1954 when a dual-fuel installation was built at Mirrlees Works, Stockport. A special plant was installed, including a gas main, compressor, cooler and surge tanks through which town gas was brought in at the required temperature and pressure to the test engine. By July 1956 the engine was fully converted to gas operation, since when more than 1,000 hours running at 100 lb per sq in. bmeep has been logged. This relatively low rating results from the high hydrogen content of the town gas supply, which has a self-ignition temperature of 1,500 deg. R., thus limiting the boost pressure which can be applied. On methane, however, which has a self-ignition temperature of 1,700 deg. R., a service rating of 130 lb per sq in. bmeep can be achieved without change of design.

No basic design changes from the conventional K series have been necessary and the standard fuel pump is retained. The helix on the pump plunger, however, is modified to allow fuel input control down to zero. The fuel nozzle, moreover, is specially designed to provide the fine spray necessary for pilot ignition and provision is made to counter the high nozzle temperatures experienced when only small percentages of liquid fuel are being passed. The standard air manifold has been subdivided on the dual-fuel unit to serve as a combined gas/air manifold. Connections are arranged to pass the air through butterfly valves under the control of the governor and the gas, via a special metering valve also under governor control, to the cylinder head. Mixture strength is thus closely controlled to provide stable operation at both extremes of the load scale.

Cylinder head modifications include the incorporation of a gas poppet valve to control the period of gas entry into the cycle. Provision for operating this third set of valves was made at the time the original K engine was designed. Governing on the dual fuel unit is through a spring box which enables the engine to be switched from dual-fuel to full diesel, or through any required

proportion from 50/50 gas/oil to 94/6 gas/oil, a dial being provided to indicate the percentage in use. These latest developments enable the Mirrlees K type to operate particularly well on sewage sludge gas and natural gas, and the design will be available with up to 16 cylinders to cover a power range from 456 to 3,640 bhp over a speed range of 300 to 450 rpm.

Lubricating Oil Deacidifier

Sharples Centrifuges Limited have introduced a new device designed to maintain the quality of diesel engine lubricating oil. It is a deacidifier and consists of a small treatment tank containing pellets of alkaline earth carbonates. These provide a large contact surface with virtually no resistance to flow and have the property of neutralizing harmful components in the oil such as mineral acids. The pellets will not react with any of the additives in the lubricant and their composition is such that there is no tendency to clog-up the treatment chamber. Maintenance of the new unit merely comprises the recharging of the chamber regularly with pellets to replace those which have been consumed by the reaction.

Tug For St. Lawrence Seaway

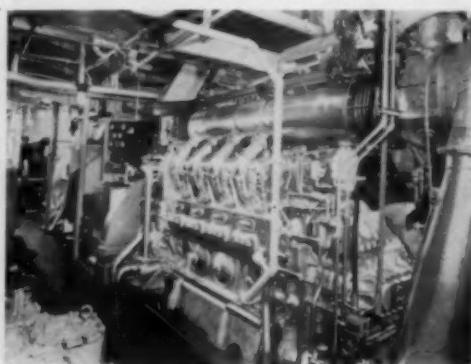
for buoy tending and the handling of heavy equipment around the lock. The *Robinson Bay* has a specially designed hull for ice breaking service. The main power plant consists of an 8-cylinder Cleveland Diesel model 498 turbocharged 2-cycle Diesel engine, direct-connected to a 970 kw generator in a diesel-electric drive. The engine is rated at 1,400 bhp at 800 rpm and the propulsion motor drives the five bladed 10 ft diameter propeller through a reduction gear to the full rated speed of 144-180 rpm.

Control of the vessel can be effected from three stations, namely: the engine room, pilot house and after deck. A belt driven 120 volt, dc, 24 kw generator mounted on top of main generator provides power for excitation, control and some of the ship's service load. Two additional auxiliary General Motors 30 kw, diesel generator sets, 120-volt, dc, furnish power for the remaining auxiliary equipment. There is also a General Motors 4-

cylinder Model 71 engine which drives a 1,500-gpm fire pump. Other features of the *Robinson Bay* are: 300-ton gate lifter derrick; a light derrick; twin fire nozzles; hydraulic steering gear; 12½ hp gypsy capstan; 7½-hp cargo winch mounted on deck and hand hoist for topping lift; radar; radio-telephone; and gyro compass.



The first tug to be built for the St. Lawrence Seaway Development Corporation is the Cleveland Diesel powered tug, *Robinson Bay*. The 103 ft tug was designed by Merritt Demarest, Long Island, and built by the Christy Corporation, Sturgeon Bay, Wisc. The *Robinson Bay* is classed by the American Bureau of Shipping for coastwise service. The new tug is in service at the Eisenhower Lock at Messina, New York. The tug will be used



M/V LAKEWOOD

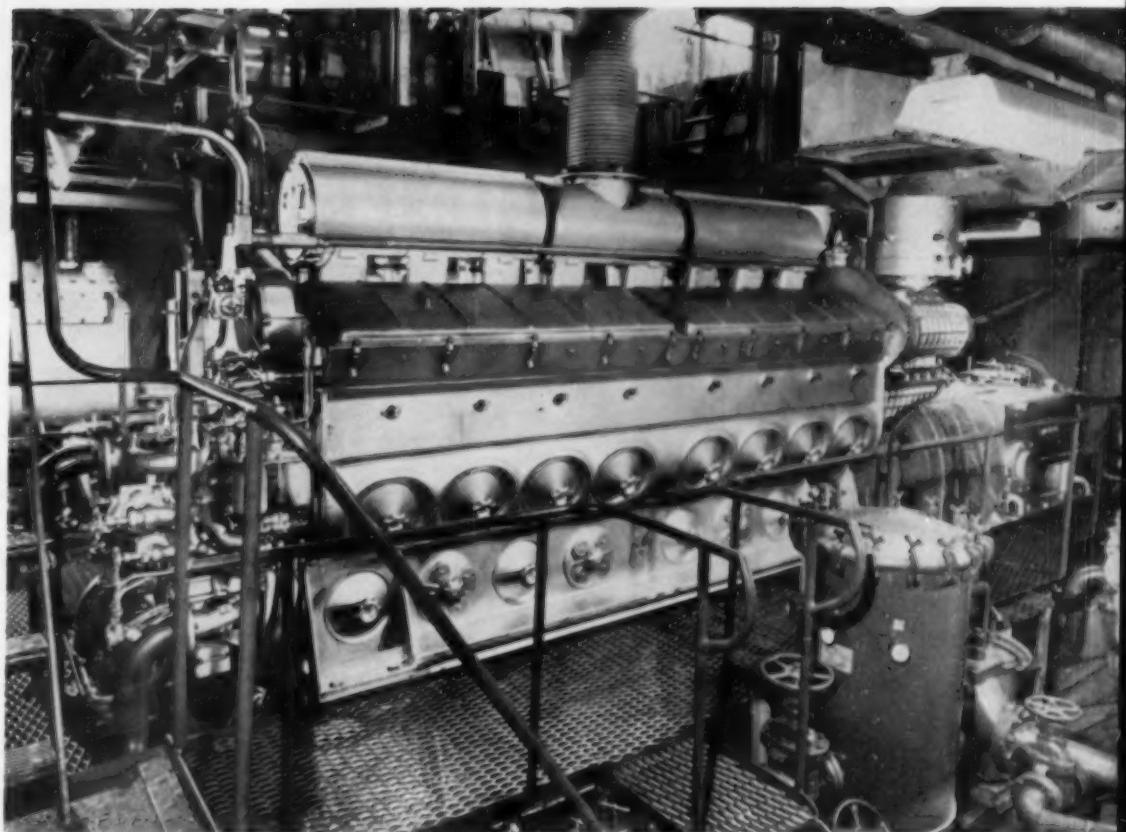
By W. L. BODE

THE M/V *Lakewood*, owned by the Presque Isle Transportation Company, and operated by the Erie Sand Steamship Company, Erie, Pa., is the most recently converted diesel sand dredge. Conversion work was started in 1956 when the 800-hp Cleveland Diesel engine was installed in place of a steam turbine for the operation of the *Lakewood's* dredge pump. Then in the winter of 1957, another Cleveland Diesel engine, a 1,600-shp, model 567C, was installed for the vessel's main propulsion. This is the first season for the *Lakewood's* operation with full diesel equipment. All conversion work was done at the yard of the Erie Sand Steamship Company, Erie, Pa.

The main propulsion machinery consists of a 16-cyl. model 567C Cleveland Diesel engine. This engine has 1,600-shaft hp at 800-rpm. The engine is direct-connected with a Wichita clutch and drives through reduction gears a three blade propeller. The *Lakewood* is also equipped with pilot house control. The diameter of the propeller is 10 ft-3 in. and has a 6 ft pitch. Chief Engineer Jesse Bollinger reports that, "with the propeller making 202 turns, the *Lakewood* maintained a speed of 12 miles an hour."

The use of the Wichita clutch in this installation has proven very satisfactory because of the "slip" feature. It is necessary for the *Lakewood* to "hover" over sand beds while maintaining only steerage way and this can be accomplished by the new clutch. The power for the operation of the dredge pump is provided by an 8-cyl. model 567C Cleveland Diesel engine. This engine drives the dredge pump through a disconnecting Airflex clutch and reduction gears. The engine delivers 800-hp at 800-rpm. As it was earlier mentioned, this part of the *Lakewood's* conversion from steam to diesel was performed one year ago. The vessel with this new equipment has had one full year of successful operation.

One of the most unusual features of this conversion is the fact that all auxiliary equipment on the vessel, such as pumps, anchor, windlass, driving equipment and steering are accomplished by the use of compressed air. The air is furnished to one of the main boilers which was not removed in the conversion, and used as an air receiver, the air being supplied by one 900-cfm compressor driven by a General Motors model 6-110 diesel engine and a 600-cfm auxiliary compressor driven by a General Motors model 6-71 diesel engine. By the use of air rings in the air steam equipment and permanent type lubricators, it was possible to increase the efficiency by 30%. This method of auxiliary operation has very substantially reduced cost of such a conversion over all previous methods.



The main propulsion engine of the *Lakewood* is a Cleveland Diesel 16-cylinder, 1,600 shp model 567C Diesel engine. This engine replaced a steam plant in the sand dredge. The engine drives through a Wichita "slip" clutch and a 4:1 reduction gear to the tail shaft. Note Briggs filters and Marquette governors.

The *Lakewood* is 377 ft long, 48 ft-2in. wide and 24 ft deep. There is a fuel capacity for 40,000 gals. of fuel oil, and the average consumption is about 1,600 gals. per day. The cargo capacity of the two holds is 4,000 cu yds of sand. The approximate loading time is between 8 and 8½ hours. The vessel can be unloaded in 8 hours. Sand is dredged from a maximum depth of 65 ft. The dredging operation is done at a distance of 20 miles from the

shore. The sand is delivered to yards in Buffalo, Erie, Ashtabula, Fairport, Cleveland, Lorain and connecting rivers.

James W. Reid is Captain of the *Lakewood* and she carries a crew of 27 men. The vessel was built as a bulk cargo carrier in Chicago in 1903. She was converted into a sand dredge at Manitowoc, Wisconsin in 1928, and reconverted in 1955.

The M/V *Lakewood*, owned by the Presque Isle Transportation company and operated by Erie Sand Steamship Company, was converted from steam to diesels in the winter of 1957-1958, at the yards of Erie Sand Steamship Company, Erie, Pa. The *Lakewood* hauls 4,000 cubic yards of sand on each trip to Buffalo, Erie, Ashtabula, Fairport, Cleveland and Lorain.





DIESEL SERVICE PROGRESS

A COMMENTARY BY GEORGE R. MACKEY

George R. Mackey was long associated with Detroit Diesel Engine Division of General Motors Corp., and had prior experience as a mechanic in Europe and the U.S.A., which enabled him to become well acquainted in the diesel and service fields and to obtain a broad scope of the service industry from the customer's and management's viewpoint. Further training at Carnegie Tech and in the Army Ordnance during World War II provided the necessary requirements in planning service programs. Progressive advancement in diesel service areas in General Motors and with Detroit Diesel led to his position as Supervisor of Service Promotion. Upon termination of employment with General Motors in 1952, he joined Clayton Manufacturing Company, and his present position with this organization is Sales Manager of the Dynamometer Division.

Service Shop Planning

The importance of the service shop, its layout, appearance, and productivity, and the effectiveness of the service shop operation towards the overall operation of any organization, is the responsibility of service management. Unless shop space and man power is properly utilized, service volume, profits and productivity will be restricted.

Utilization of Shop Space

To analyze the full utilization of shop space, many items must be taken into consideration. Some of these items are: 1. The relationship of shop productivity and man power. 2. The utilization of wasted space for production use. 3. The assignment and conservation of production space. Most engine and equipment manufacturers realize that only through their distributor/dealer organizations can they cooperatively fulfill their positive obligation to make available the best possible service for their products sold. To assist the distributor/dealer organization in fulfilling their service obligation in the most effective manner, manufacturers, through their own service departments, are continually looking for faster, more effective methods, and the application of new tools and equipment. Many manufacturers, through their distributor/dealer organizations offer their service planning assistance to large fleets or contractors' shops having a service volume large enough to justify the operation of a service department.

Relationship—Shop Space and Effective Service

Recognizing the importance of effective service, and the relationship of shop space, tools, equipment and operating procedures to service productivity and profit, many manufacturers have organized development or promotion departments within their own service organization. These departments are responsible for: 1. The overall effectiveness of their distributor/dealer service operations. 2. Establishing methods and procedures for more effective service. 3. Helping distributors and dealers plan and maintain a complete service opera-

tion. 4. Recommend tools and equipment that will aid their service outlets in fulfilling their obligation of making complete service available. 5. Developing promotional programs for distributors and dealers to influence customers on the completeness and superiority of their service. It is a proven fact that a well planned, organized service program can be profitable and a sure means for retail establishments to continue friendly relations with engine and equipment owners.

The future of any distributor or dealer, and fleet operation, depends on its service operation. Therefore, every person that is associated with it must have the proper perspective, and know that he is a member of a team that has a definite obligation. Every member of the organization must be made to realize that what the service department sells to its customers is not just parts and labor, but power and performance. Good service is the active custodian of owner's good will and satisfaction by proving the economy, dependability and power built into the products the customer purchases. Without sufficient space and the proper utilization of available space, the service department can easily fail to meet its obligation and will not be able to fulfill many of its responsibilities. Possibly one of the first questions that comes up during the planning stages of setting up or expanding a service department is—How big should the service shop be?—To this question, there are many answers. Some of the answers will reflect the attitude of the distributor or dealer towards service. In many instances, the service shop will be selected after consideration is given to the immediate service needs. In other instances, the total service potential is taken into consideration, which includes the servicing of all products handled. Very often though, the service shop is set up without sufficient planning for future expansion to meet a growing potential, and almost immediately it is found to be too small to handle the service volume. The total service potential is the only basic foundation for determining the size of the service operation. This can be determined from an analysis of the engines and

equipment that will require service and the logical sequence of action that will be taken to service the equipment.

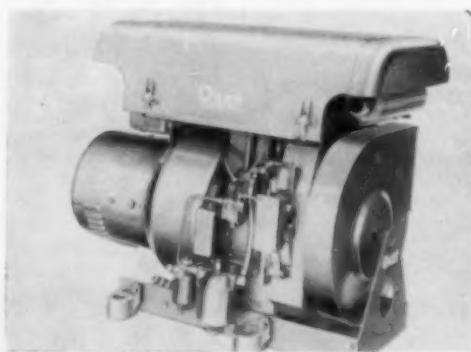
Analyzing the Service Potential

The planning of a service shop in a fleet operation is relatively simple compared to the planning of a distributor's or dealer's service shop as the fleet generally has complete records of numbers and types of equipment that will require service. The fleet's service volume, or potential is more or less fixed. For a distributor or dealer to plan a service shop on the same basis of analyzing the service potential, many things must be taken into consideration. Some of these are: (1) the total number of engines or pieces of equipment sold in the territory; (2) engines or equipment sold into the territory by other distributors. This is especially important to engine distributors and dealers who are expected to service engines sold in such end products as shovels, cranes, rock crushers, earth moving equipment and oil field equipment; (3) government surplus equipment operating in the territory; (4) transit business; and many others. It is obvious that the total hours of operation on engines and equipment will greatly influence the service activity and potential. If the majority of engines and equipment in the territory are relatively new, the number of major overhauls and rebuilds will be low. The volume of sub-assembly repair and overhaul will also be low at first. However, the service shop should be planned and equipped to handle the total service volume that will eventually develop. A well planned service operation will not let the increase of service business that will come with added hours of equipment operation find it unprepared to obtain all of the service volume and profits.

Engine distributors and dealers must take another important factor into consideration when planning a shop based on an analysis of the service potential. This factor is the wide and diversified application of the modern engine. With such widely varying applications, naturally the engine life

will vary widely. For example: An engine used for electric power generation, where constant speed and load, and generally operation under ideal conditions are the rule, can be expected to have a longer life than an engine installed in a piece of construction equipment where extreme loading, wide speed variations, and possible operation under adverse conditions are common. Therefore, it is advisable for the service department to maintain records covering the many different engine installations in the territory. Even though these records may not be required for immediate planning purposes, they will certainly prove invaluable for future development and expansion of the service facilities, as well as the planning of a complete service promotion program. Some service operations may have an up-to-date analysis of the total number of engines or equipment in the territory, but have not been able to set up records from which they can accurately determine the amount of time between overhauls, or the frequency of sub-assembly rebuilds or service. In general, it can be expected that on an average, a complete major engine overhaul is performed every three or four years of operation. Where operating conditions are extremely severe, this period can be every two years or less. Also, the additional volume of sub-assembly work, such as: injector and fuel pump rebuild, blower overhauls, etc., will on an average be equal to the sub-assembly repair work from the engines overhauled. This means that on an average a service shop can aim to perform a major engine overhaul on one-fourth of the engines in the territory every four years and in addition an equal amount of sub-assembly service work. When the complete service potential is established, there are still a great many things to be considered for efficient shop operation. Before a service department can perform any service, it must have mechanics to do the work, space for them to work in and tools with which to do the work. The lack of any one of these factors will limit the productivity of the department.

3 KW Diesel Electric Plant



A new 3,000-watt air-cooled diesel electric generating plant is announced by D. W. Onan & Sons Inc., Minneapolis, Minnesota. Patterned after the DSP Series of diesel plants formerly produced by the company, this new Onan electric plant primarily features the Onan cooling system, Vacu-flo. This new, efficient vacuum cooling system employs a powerful centrifugal blower that pulls cooling air through the generator and over the heated engine parts and then expels the heated air through a

Value of Shop Space

Inasmuch as we are at this time primarily concerned with the planning of shop space, and the proper utilization of shop space, we must consider the value of the space and determine how much each stall, or repair area, is worth in labor sales or productivity. To do this, we must evaluate each working area and determine what must be expected from it so that it will contribute to the overall success of the service shop. Therefore, we must determine how much is one working area worth in labor sales for one day, for one month, for one year. If we consider \$5.00 per hour to be an average for labor sales, and an average of eight hours per day, the receipts for one work area will be \$40.00 per day, \$880.00 per month, based on 22 working days per month, or based on 264 working days, \$10,560.00 per year. These amounts represent the labor sales that should be derived from each productive work area. Oftentimes the addition of one more production work area will change the figures in the profit column from red to black. Furthermore, the addition of one more work area may help the service department to reach its objective of labor sales and profits. Study of these figures, as they relate to any individual service operation, will show the relationship between productivity and working space; and the relationship between service volume and profits.

The alert service manager must continually be on the look-out for productive work areas that are not being used for productive purposes. In order for the service department to meet its obligations, a definite number of work areas must be assigned for productive work, and the work load scheduled to keep each area producing. Only when these conditions exist can the service department stand on its own feet and pay its own way. It will then be looked upon as a profitable part of an organization and not a necessary evil. To determine the number of working areas needed to reach the service volume objective, it is necessary to divide the

duct to the outside. This cooling feature enables the new Onan DSL plant to be installed in completely enclosed compartments, in a space just slightly larger than the unit and its accessories, with allowances for an air-intake and exhaust outlet. With Vacu-flo, this new unit automatically ventilates the compartment or room where it is installed and a new, muffler assures quiet, smooth-running performance.

Because of their compact size and unique cooling system, the new Onan DSL models are suited for mobile and portable uses. In the communications field, they save valuable space in vehicles loaded with vital electronic equipment. On construction jobs where reliable electric power must be supplied independently to operate floodlights or modern electric tools, these new diesels meet the critical requirements of mobility and heavy-duty service. Weighing only 470 lbs, Model DSL can be taken anywhere in its own trailer or can be installed in any pick-up truck or other vehicle. A new steel turret hood permits all-weather operation and protects the plant against falling materials on construction jobs. This compact power package can also be adapted for marine use. Equipped as it

anticipated volume by the full productivity of one working area. For example: if the anticipated service volume is computed for a quota of \$8,800.00 per month, and one working area will produce \$880.00 labor sales per month, it is logical to determine that 10 production work areas will be required to meet the labor sales objective.

Keeping Work Areas Productive

When an area has once been assigned for production use, it must not be used for any other purpose or the relationship between productivity and shop space will be disrupted. Even though management's intentions to keep each assigned area productive may be well founded, unless strict supervision is enforced, production space may be filled but not earning money. Some of the most common causes for this are: 1. Work started on equipment but required replacement parts not available. If this job waited five days for the replacement part, the area would lose \$200.00 labor sales. 2. Service repair cost estimate awaiting customer confirmation. If this area were tied up for 3 days waiting for the confirmation, \$120.00 labor sales would be lost. When a service job is completed, the serviced unit should be moved to a non-productive area immediately so that another job can be started at once. If, at the completion of a service job, one hour were required to move the finished job out and bring in a new one, and a service shop had four such changes a day, four hours total would be required, or 50% of the productivity of one working area. Strict supervision of all production areas is a definite requirement if the service department is expected to fulfill its obligations and share in the overall profits of a business organization. Only by following well organized plans can the service shop expect to handle the service potential and be assured of a steady flow of work through the shop. Planned, well organized service will result in greater service volume and service profits, and customer satisfaction.

is with Vacu-flo Cooling, this diesel generating plant is designed for dependable operation below decks on both pleasure and workcraft. The unusual cooling system provides not only adequate cooling for the engine-generator but also a large amount of positive ventilation of the bilge, engine-room or compartment in which the generator set is installed. In addition to the standard voltages (115 v; 115/230 v; 230 v; 60-cycle) the DSL plants can be obtained in 24-30 volt, 32-40 volt and 110-140 volt battery charging models. 50-cycle models, rated at 2,500 watts, can also be supplied. For more information on these new diesel electric generating plants, write the manufacturer: D. W. Onan & Sons Inc., Minneapolis 14, Minnesota. ITS NEW

HERE IS IMPORTANT INFORMATION! The completely new 1958 edition of the **DIESEL ENGINE CATALOG**, Volume 23, is now available. If you design, purchase, sell, operate or service diesel, dual fuel or gas engines, the Catalog is essential to you. This giant, 400 page, 10½" x 13½", fully illustrated reference book has been revised, rewritten and brought up to date completely from cover to cover. Send your order in now for this limited edition, which costs \$10 postpaid plus California sales tax where applicable. Send checks or company orders to **DIESEL ENGINE CATALOG**, 816 N. La Cienega Blvd., Los Angeles 46, Calif.



GAS TURBINE PROGRESS

A COMMENTARY BY R. TOM SAWYER

R. Tom Sawyer's well known in the gas turbine field having been the first chairman (1944) (and now treasurer) of the Gas Turbine Power Division of ASME. He spent 7 years with G.E. Transportation Dept., and 26 years with American Locomotive, now Alco Products. At present he is a Consultant, including "Consultant to the Staff" of the Experimental Towing Tank at Stevens Institute of Technology. In addition to being a Fellow Member of ASME and AIEE, he is a member of SAE, ARS, ANS, IME in London, DEUA in London. He is also a member of Franklin Institute and a Professional Engineer. Mr. Sawyer is the author of *The Modern Gas Turbine and Gas Turbine Construction*, and co-author of *Applied Atomic Power*.

Automotive Gas Turbine Units*

AT the end of the last war gas-turbine propulsion of military vehicles such as heavy tanks was studied intensively in Europe, and as a result C. A. Parsons & Company, Limited were entrusted by the Ministry of Supply with the task of developing a suitable gas turbine for propulsion of military vehicles such as heavy trucks. A team under Dr. A. T. Bowden designed such a gas turbine, two units were made by the Company, and in 1954 the first gas-turbine-propelled tank in the world was publicly shown. Since then extensive tests have given proof of the suitability of this type of prime mover for such a duty. As C. A. Parsons Company Ltd., were not in the automotive business their approach to the design of the gas turbine was strictly an impartial one. Their analysis covered practically every major possibility and many minor ones. This company is well known in heavy industry which includes gas turbines, heat exchangers and component parts. Let us look at some of the results which they have learned, and some of

the studies they have made specifically directed toward the automotive gas turbine.

Figure 1 shows a unit for an auto. Note it's the high pressure, or first stage turbine, that drives the auto. This has certain advantages over the conventional method of using the last or low pressure turbine for the power unit. Summarizing the analysis up to this point it would appear that a number of important problems pertinent to the successful design of a gas turbine for vehicle propulsion can be solved, especially where a good performance at low average loads is demanded, if the high pressure instead of the low pressure part of the turbine is used for power. The use of ceramic materials in the construction of regenerative air preheaters will not only eliminate any difficulties arising from unduly high temperatures but will also reduce weight. There are still, however, a number of outstanding problems. Apart from the fact that for different vehicle requirements, differ-

Fig. 1—Automotive gas turbine unit. Note there are two separate 4's each rotated on a shaft driven by one gear in the center and through the center of the shaft of this gear enters the fuel line. The auxiliaries including the starter, the generator etc. are on the left driven by the compressor shaft.

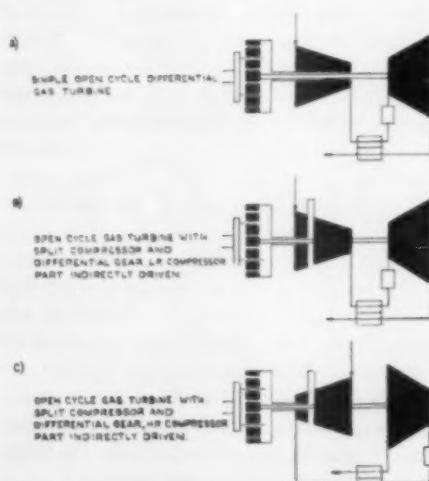
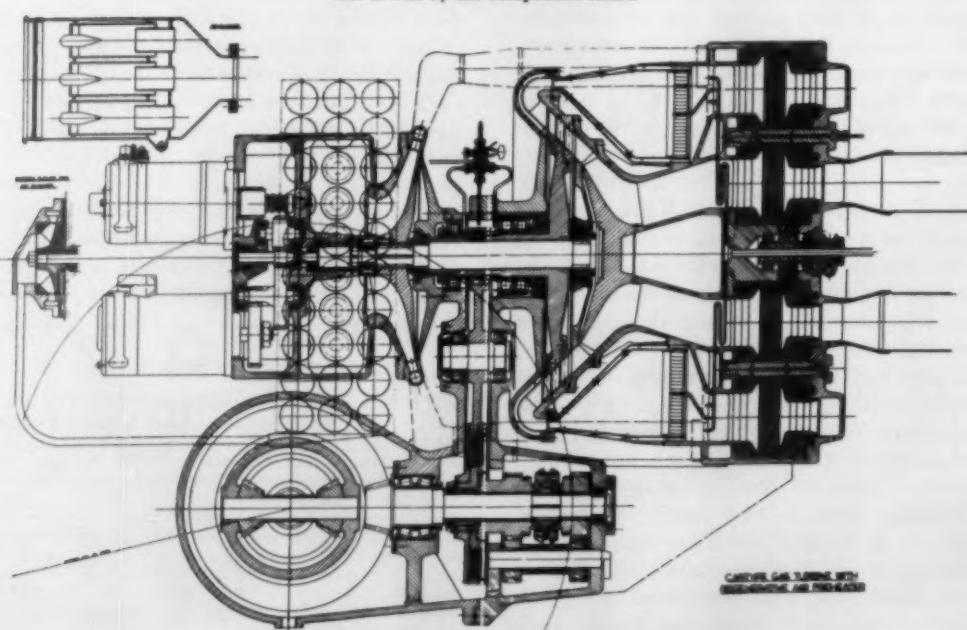
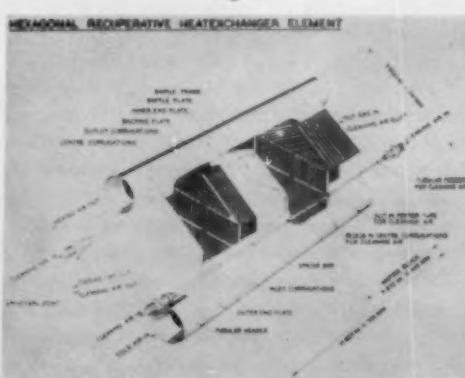


Fig. 2—Automotive Gas Turbine Combinations used with the Differential Gear.

ent turbine arrangements have to be chosen, a disadvantage from a manufacturing point of view, there remain the design drawbacks resulting from splitting the turbine, the lack of a negative torque, and the partly indirect control with its effects on

*ASME Paper 58-SA-26, "Some Thoughts About the Development of Automotive Gas Turbine Units" was presented at Detroit June 16th, 1958. Paper by Dr. A. T. Bowden, Director and Chief Research Engineer, and Dr. W. Hryniszak, Research Engineer, both with C. A. Parsons & Co., Ltd., Newcastle-on-Tyne, England.

Fig. 3



response to load changes. The question arises: "Is there any possibility of affecting the compressor directly by this power so that splitting of the turbine is unnecessary?" The answer to this question leads to the gas-turbine unit with a split compressor, and a differential gear between the two compressor parts and the power-transmitting shaft." See Figure 2 parts B and C.

The paper describes several methods of splitting the compressor. There are also other ways of splitting both the compressor and turbine to obtain many interesting results. It is purely a question as to the cost of the arrangement compared to its results, and this means the cost of the overall power unit. Therefore a split unit must be used in most automotive applications. Dr. Bowden's team is to be congratulated on the extensive study and equipment built of heat exchangers. The paper states "The incorporation of an air preheater is imperative especially where a good performance is required at a low average load. The employment of such a heat exchanger in the gas-turbine unit, especially if the utmost compactness is to be met, is difficult as low parasitic-pressure losses are essential. The important step toward the standardization of the heat exchanger for universal use in gas-turbine units of any design, which should be the ultimate aim, is therefore very hard to achieve especially if the regenerative moving type instead of the recuperative stationary process is chosen for the exchange of heat." Therefore even if the compressor has a high pressure ratio at full load a heat exchanger is needed for economy at the lighter loads, the heat exchanger must be considered in the overall use for vehicles. At least three of the moving or regenerative type were built, one rotary, two of the piston type and of these one had the matrix in the piston and the other outside; the piston is used to change the flow of gases. Where the rotary has a 4% loss, the piston has 1% loss due to the use of a well-tried sealing element, the piston ring. The conclusion reached was to use a stationary heat exchanger similar to Figure 9 which has no loss and permanent seals. Many designs of stationary units were built starting with the tubular and ending with the plate-type matrix.

Therefore the gas turbine with split compressor and a recuperative air preheater composed of elements having a plate type matrix has the greatest promise in the future automotive field according to Dr. Bowden's team. I must agree it looks very good.

Elected Executive Vice President



John Tullis

Election of John Tullis as Executive Vice President of Stratoflex, Inc., has been announced by President Ken W. Davis from Fort Worth headquarters of the organization. Formerly Executive Vice President of Unit Rig & Equipment Company in Tulsa, Tullis has also been acting

as Vice President - Manufacturing of Stratoflex, Inc. He is a graduate mechanical engineer and holds this degree from Oklahoma State University.

for every requirement

STRATOFLEX
HOSE & FITTINGS

- Fuel Lines • Hydraulic Systems
- LP-Gas Lines • Air Brakes
- Lubrication Systems • Water
- Coolants • Refrigerants

Made in a wide variety of sizes and types for hundreds of commercial and industrial uses, Stratoflex detachable and reusable fittings simplify maintenance and assure leak-proof connections under extreme temperature variations. Stratoflex hose provides the flexibility, small bend radii and durability essential for dependable service.

For detailed information, write for industrial catalog.

SF7-8

STRATOFLEX *inc.*

P.O. Box 10398 • Fort Worth, Texas
Branch Plants: Los Angeles, Fort Wayne, Toronto
In Canada: Stratoflex of Canada, Inc.

SALES OFFICES:
Atlanta, Chicago, Dayton, Detroit, Houston, Kansas City, Los Angeles, New York, Pittsburgh, San Francisco, Seattle, Toronto, Tulsa

Gulf Coast Diesel

Notes

By Michael T. Pate

COMPANIE de Azufre Vera Cruz, Houston, Texas, has secured from Stewart & Stevenson Services, Inc., Houston, two series 71, 6-cylinder, model

6071-A General Motors marine diesels.

GARDNER-Denver Company, Dallas, Texas, has taken delivery from Waukesha Sales & Service, Inc., Houston, of a model 148DKBU Waukesha diesel, rated 141 hp at 1400 rpm. The diesel is intended for pump drive service.

CABOT Shops, Inc., Pampa, Texas, has

secured from Stewart & Stevenson Services, Inc., of Houston, two Stewart & Stevenson RD-20 dc rig-lighting plants, rated 20 kw at 120 volts. The units are powered by series 71, model 2030-C General Motors diesels.

HEAD & Guild Machinery Corporation, Houston, Texas, has bought from Stewart & Stevenson Services, Inc., Hous-

ton, a model 71, series 4055, 4-cylinder General Motors diesel which has been installed in the customer's crane by the service company.

PLATZER Shipyard, Houston, Texas, has secured from Stewart & Stevenson Services, Inc., Houston, a model 4GD-70 Stewart & Stevenson ac generating set. The 70 kw generator is driven by a series 71, model 4061-A General Motors diesel.

WRIGHT Brothers Electric Company, San Antonio, Texas, has bought an automatically operated Stewart & Stevenson model 3GD-45 generating set, powered by a series 71, model 3030-C General Motors diesel.

ALGODONERA Popular, S.A., Matamoros, Mexico, has bought from Stewart & Stevenson Services, Inc., Houston, a General Motors quad-six diesel, series 71, equipped with a 1.75:1 reduction gear. The 600 hp diesel will be used to power a cotton gin.

TEXAS Highway Department, Houston, Texas, has bought from Stewart & Stevenson Services, Inc., Houston, a model 2GD-15 Stewart & Stevenson 15 kw generator set powered by a series 71, model 2061-A, 2-cylinder General Motors diesel.

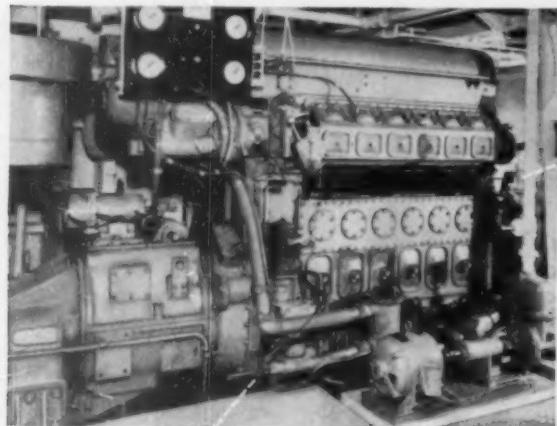
BUZZINI Drilling Company, San Antonio, Texas, has secured from Waukesha Sales & Service, Inc., Houston, a model 135DKU Waukesha diesel-powered generator set. The diesel is rated 106 hp at 1800 rpm. The unit is for auxiliary power on a drilling rig.

THE Chicago Procurement Office, Corps of Engineers, United States Army, has taken delivery of an additional 63 Stewart & Stevenson special generator sets, 45 kw, ac, each powered by a series 71, 6-cylinder 3030-C General Motors diesel.

GARDNER-Denver Company, Dallas, Texas, has taken delivery of two model 148DKBU Waukesha diesels, rated at 167 hp at 1800 rpm, for compressor drives. The diesels were sold by Waukesha Sales & Service, Inc., Houston.

J. ADAMS Johnson, Coden, Alabama, has bought from Stewart & Stevenson Services, Inc., of Houston, a series 71, 6-cylinder General Motors marine diesel, equipped with reduction and reverse gear and rated at 200 hp.

EL DORADO Water Company, El Dorado, Arkansas, has secured from Waukesha Sales & Service, Inc., Houston, two Waukesha model 6NKRBU engines, rated 265 hp each at 1100 rpm, which will be used to power two of the company's water wells.



*
**Fairbanks-Morse
Marine O-P Diesels
Help Make the
605 Ton Pure Oil
M/V R.B. Kelly...**

"One of the Most Flexible Pieces of Floating Equipment Ever Built!"

—so says the president of Equitable Equipment Company who built this rugged, multipurpose craft in 1955.

The R. B. Kelly is serving as cargo ship, supply vessel, A-1 water carrier, tug boat, or operational barge serving offshore installations of the Pure Oil Company in the Gulf of Mexico.

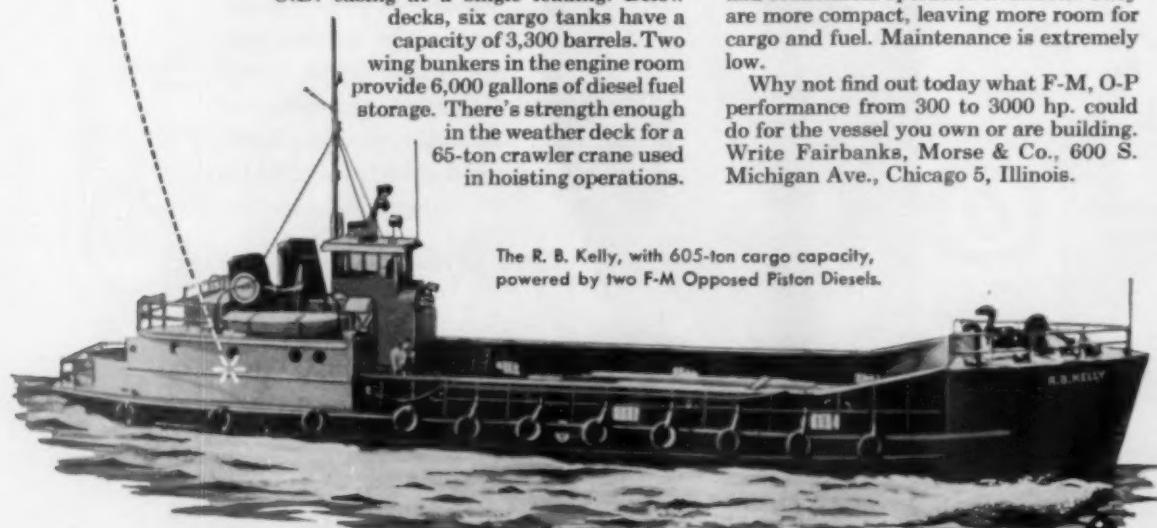
The Kelly can carry 10,000 feet of 9½" O.D. casing at a single loading. Below decks, six cargo tanks have a capacity of 3,300 barrels. Two wing bunkers in the engine room provide 6,000 gallons of diesel fuel storage. There's strength enough in the weather deck for a 65-ton crawler crane used in hoisting operations.

The R. B. Kelly is powered by two, 6-cylinder 38F5-½ Fairbanks-Morse opposed piston diesel engines. Each one is rated at 450 hp. at 1200 rpm. Together the engines afford a line pull of 25,000 lbs. Her maximum speed is 12½ knots.

More and more vessels today in all waters are turning to F-M Opposed-Piston Diesels as the finest source of power and economical operation available. They are more compact, leaving more room for cargo and fuel. Maintenance is extremely low.

Why not find out today what F-M, O-P performance from 300 to 3000 hp. could do for the vessel you own or are building. Write Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago 5, Illinois.

The R. B. Kelly, with 605-ton cargo capacity,
powered by two F-M Opposed Piston Diesels.



FAIRBANKS-MORSE
a name worth remembering when you want the BEST

DIESEL AND DUAL FUEL ENGINES
DIESEL LOCOMOTIVES • RAIL CARS
ELECTRICAL MACHINERY • PUMPS
SCALES • HOME WATER SERVICE
EQUIPMENT • MAGNETOS

West Coast News

By James Joseph

INSTALLED in the 75-ft auxiliary racing ketch *Kamalii*, owned by Los Angeles' E. L. Doheny III and built by Wilmington Boat Works, Inc., two Mercedes-Benz diesel engines—a 185 hp OM315A turbocharged main engine driving a 32x24-inch prop thru 2:1 reduction; and an OM 636 36 hp auxiliary driving a Still generator.

TO Fairbanks, Alaska's Northern Electric Corp., two 4-cylinder, 450 hp Model 38F5½ Fairbanks-Morse diesels.

CASCADE Kraft, Division of Boise Cascade Corp., Wallula, Wash. has taken delivery of a 230 hp, model 49B4½ Fairbanks-Morse engine.

FOR Mammoth Mountain Chair Lift a Model JT-6-P Cummins with Twin Disc power take-off for use as portable wood chipper. Sale by Cummins Service & Sales, Los Angeles.

DELIVERED to: U.S. Coast Guard, Terminal Island, Calif., a GM 4-51 swinging 25x20 right hand wheel thru 3:1 reduction, for 35 ft launch. Sale by Crofton Diesel Engine Co., San Pedro.

POWERING 27 ft towboats are two GM 6-110s, installed by San Pedro's Forster Shipbuilding Co.

AS auxiliary for pump and generator on Bill Odette's live bait boat operating from Newport Beach, Calif., a GM-2061-A.

TO J. M. Goldberg, Houston, Tex., an NH-220 Cummins for repowering his Kenworth truck. Sales by Cummins Service & Sales, Los Angeles.

SALT LAKE City's Jaharies Brothers has taken delivery on an NH-220 Cummins for repowering a Kenworth rig. Sale by Cummins Intermountain Diesel Sales Co., Salt Lake City.

FOR driving turbine fire pumps, a 150 hp Model 49 Fairbanks-Morse engine has gone to Grinell Co. of Pacific, San Francisco.

COLLINS Electrical Co. Inc., Stockton, Calif. has purchased a 30 kw, model 48AG4½ Fairbanks-Morse diesel generating set.

FOR standby pumping service at its Coldwater Canyon, Los Angeles pumping station, the LA Dept. of Water & Power has purchased a Model VT-12-1 Cummins Turbodiesel.

TO SAN Pedro Tugboat Co., a GM 2061-A as auxiliary for pump and generator on company tug.

POWERING 20 kw generator set aboard *Ferry Islander* is a GM-2061-A, purchased by the Los Angeles Harbor Dept.

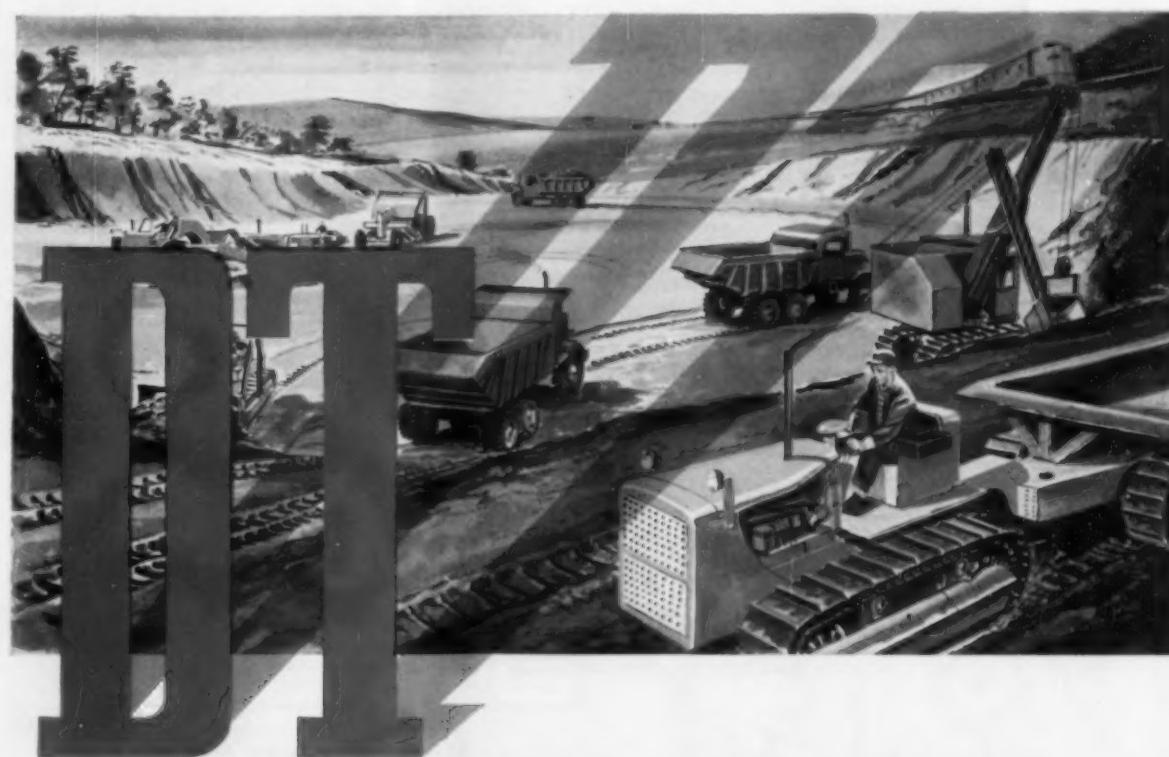
A GM-3071-A working thru 3:1 reduc-

tion and swinging a 34x26 wheel powers the 40 ft commercial fishing boat *Pie Face*, owned by Newport Beach's William Slingsby.

FOR Pierpoint Landing's auxiliary on sportfishing boat *Spitfire*, a GM 2061-A. Boat operates from Long Beach, Calif. Sale by Crofton Diesel Engine Co., Inc. San Pedro.

TO SAN Francisco's Allied Land & Livestock Co., a 60 hp model 49B4½ Fairbanks-Morse diesel.

INSTALLED in new Bay City model 260 MotoCrane, owned by Bragg Crane Service, North Long Beach, Calif., an NH-6-BI Cummins for propulsion and a JN-6-BI Cummins with Twin Disc single-stage torque converter for crane.



KEEP DIESEL OPERATIONS OUT OF THE RED SHADOW OF DOWN TIME!

Rx Prescription Filtration FOR DIESEL FUEL AND LUBE OILS

WIX offers many outstanding filtrants especially engineered to provide a Prescription type Cartridge for your individual operating conditions.

WIX has developed every filtrant for peak dirt retention—even microscopic particles are trapped—to give greater intervals between Cartridge replacements and higher filter efficiency during the longer life of every Cartridge.



Contamination in fuel and lubricating oils spells "down time" for repairs and frequent maintenance, unless this damaging dirt and sludge is kept out of your Diesel engines. You can always rely on WIX Engineered Filtration for a continuous flow of clean Diesel fuel and lube oils—WIX prescription type filtrants meet the toughest performance requirements of every engine operation! That's the reason WIX is in such wide use as original filtration equipment, as well as the first choice in countless places wherever Diesels are on the job.

Your engines can have this greater protection and longer service life at an amazingly low cost. Put WIX to work for you; keep your Diesels "out-of-the-red," and free from expensive down time!

wix®

OIL FILTERS AIR FILTERS
AUTOMOTIVE • INDUSTRIAL • RAILROAD
WIX CORPORATION • GASTONIA • N. C.

In Canada: Wix Corporation Ltd., Toronto

Florida Diesel News

By Ed Dennis

ORLANDO Public Utilities are installing two General Electric 16,000 kw, 2 stage combustion gas turbine generating units in the Orlando Municipal Power Plant. This is the first installation of its kind in Florida.

THE J. W. Goode Co., Fort Myers, state distributor for the Mercedes-Benz marine diesel engines, appointed Diesel Engine Sales of St. Augustine and its affiliated company Diesel Engine Sales of Fort Myers franchise dealers for these areas. The marine diesels are manufactured in a horsepower range from 36 to 3000 for a wide variety of marine applications.

THE 136 foot *Tiger Shark*, the latest menhaden fishing vessel to join the Gulf fleet, is powered by 4 General Motors 6-110 diesels in tandem pairs to deliver a total hp of 1200 at 1800 rpm with GM 4.1:1 r/r gears to turn two 56x46 in. 4 blade Coolidge propellers for a speed of 12.5 knots. GM 3-7IC's are in the two 36 ft purse boats and GM's power the fish pumps and compressors.

BEING repowered from coal fired steam propulsion the 90 ft *Montclair*, to a 1600 hp Fairbanks-Morse opposed piston diesel engine by the Leonardi Towing Co., Tampa. This old New York harbor tug had to be towed to Tampa due to the lack of coaling facilities on the East coast.

CAPELETTI Bros. Inc., road contractors, are currently using a UD18A International 6 cyl 125 hp at rated governed speed of 1600 rpm, to run a Cedarapids rock crusher and two TD6 International crawler tractors with dozer blades. These have 50 hp diesels in them.

THREE Euclid S7 tractor scrapers, powered with General Motors 4-71 diesels, having a cont. hp of 98 at 1800 rpm, to Pecon Corp., engineering contractors of Dade County and a Pettibone-Mulliken speed grader also with a GM 4-71.

ALLIS Chalmers diesel generating units were installed in Pump Station #6 on the Hillsborough drainage canal; two 8 cyl #1290 diesel generating sets rated 157 kw at 1500 rpm and one #468 rated 38 kw unit. All three have Allis Chalmers generators.

BUILT by Tampa Fabricators for the Ocean Drilling & Exploration Corp., two twin screw 119x32 ft off shore supply vessels powered by model D375 series D 8 cyl Caterpillar diesels and Twin Disc 2.93:1 r/r gears; Burgess Manning air intake silencers plus, 2 for each vessel, 30 kw Delco ac 60 cycle 48.1 amp 450 volt 1200 rpm generators, each powered with a GM 4-71 diesel.

NEAR Okeelanta, three Case diesel driven 12 in. Couch turbine water pumps for irrigation purposes on sugar plantations. Engine specifications are: 6 cyl 70 hp at 1500 rpm, American Bosch fuel system, Donaldson air filters; 5 V belts drive the pump off the engine power take-off.

THE newly launched 63 ft shrimp trawler *Coral Queen* had a model D342 Caterpillar marine diesel installed for main propulsion. The Cat delivers 210 hp max at 1225 rpm. The General Marine Co. of Fort Myers Beach constructed the vessel and Shelley Tractor Co. of Miami supplied the engines.

REPOWERED with a JBS 600 Cummins diesel engine rated 150 hp, the Ideal Crush Stone Co. of Medley, used a Clark torque converter in their model #175A Michigan tractor shovel. The diesel was supplied by Cummins Diesel Engines of Florida.

SOUTH of Bradenton on Route 41, the Dunn Construction Co. is using 3 and

FASTER ROUND TRIPS AT LESS COST

Since they switched
to "Jimmy" Diesels



ALABAMA—Birmingham, Montgomery
ARMSTRONG EQUIPMENT CO.
Mobile

KENNEDY MARINE ENGINE CO.

ARIZONA—Phoenix

THE DIESEL SERVICE COMPANY

CALIFORNIA—El Monte, Long Branch,

Los Angeles

ANDERSON-O'BRIEN CO.

COLORADO—Denver

THE COLORADO BUILDERS' SUPPLY CO.

FLORIDA—Jacksonville, Miami

DETROIT DIESEL ENGINE DIVISION

General Motors Corporation

(Florida Branch)

ILLINOIS—Mt. Carmel

WESTERN SERVICES, INC.

INDIANA—Evansville, Indianapolis
REID-HOLCOMB CO., INC.

IOWA—Ankeny
HICKMAN GM DIESEL, INC.

KANSAS—Great Bend, Wichita
DIESEL EQUIPMENT CO., INC.

KENTUCKY—Lexington, Louisville,
Madisonville
BOGIE EQUIPMENT CO.

LOUISIANA—Harvey
GEORGE ENGINE CO., INC.
Shreveport

UNITED ENGINES, INC.

MICHIGAN—Detroit, Grand Rapids
PENINSULAR DIESEL, INC.

MISSISSIPPI—Biloxi
KENNEDY MARINE ENGINE CO.

MISSOURI—North Kansas City
K. C. DIESEL POWER CO.
St. Louis

WESTERN MACHINERY & ENGINE CO.

NEW MEXICO—Albuquerque

HARRY CORNELIUS CO.

NORTH DAKOTA—Williston

GENERAL DIESEL & EQUIPMENT CO.

OHIO—Cleveland, Toledo, Youngstown

GREAT LAKES DIESEL CO.

Columbus

COLUMBUS EQUIPMENT CO.

Denton, Cincinnati

FLACK EQUIPMENT CO.

Steubenville

RAY C. CALL, INC.

OKLAHOMA—Oklahoma City, Tulsa
DIESEL POWER CO.

PENNSYLVANIA—Pittsburgh

HIGHWAY EQUIPMENT CO.

TEXAS—Beaumont, Corpus Christi, Dallas,

Houston, Lubbock, Odessa, San Juan

STEWART & STEVENSON SERVICES, INC.

El Paso

EQUIPMENT SUPPLY CO., INC.

UTAH—Moor, Salt Lake City

CATE EQUIPMENT CO., INC.

WEST VIRGINIA—So. Charleston,

Fairmont

RAY C. CALL, INC.

IN CANADA—Distributors in all

key locations under

GENERAL MOTORS DIESEL LIMITED

Toronto, Ontario

4 cyl series 71 General Motors diesels with Twin Disc clutches in several of their $\frac{1}{2}$ yd Koehring dragline and back hoe machines plus the GM's on the 8 in. pumps for the well points being used on the construction of a 48 in. drainage sewer system.

AN Allis Chalmers #45 motor grader was delivered to and is being used on road construction work at Cape Coral. Powered by a 120 hp Allis Chalmers 6 cyl diesel, this 4 cycle engine has a 516 cu in. displacement; grader from Square Deal Machinery of Orlando.

LLEWELLYN Machinery Corp. of Tampa and Miami have now opened branch facilities in Jacksonville and Fort Myers. They represent the Euclid Div. of General Motors Corp., J. I. Case and Cleveland Trenchers plus several other construction machinery manufacturers.

PETTER diesel engines supply power for the 1500 watt Pazi auxiliary generating units on the newly launched 67 ft trawlers Belvedore of Tampa, Barbara Ann of Key West and Tia Delta. All were launched by Diesel Engine Sales of St. Augustine and are powered by D342 Caterpillar marine diesel engines.

FLORIDA Georgia Tractor Co., Miami, supplied the three TD24 200 net hp International torque converter crawler tractors and one TD18 tractor with a rating of 105 drawbar hp to John C. Peterson Construction Co. for dozer work and to pull a model D Hyster grid roller on highway construction work.

THE 69 ft *Kobevi*, built by M. F. Shan-tau of Ocean Springs, will be powered with a model DFXE Hercules diesel engine with a max hp of 220 and a cont. hp of 159 working through a 4:1 Capitol hydraulic r&e gear driving a 3 in. stainless steel shaft and a 5 blade 46x40 Columbian propeller. When fully rigged the *Kobevi* will be worth \$35,000 and will fish the gulf for croakers.

THE Sebring Utilities Commission at Sebring, Florida, will receive a 10 cyl model 38F5 $\frac{1}{4}$ Fairbanks Morse diesel engine; it is rated 750 hp.

Marathon To Buy Two 3000 kw Units

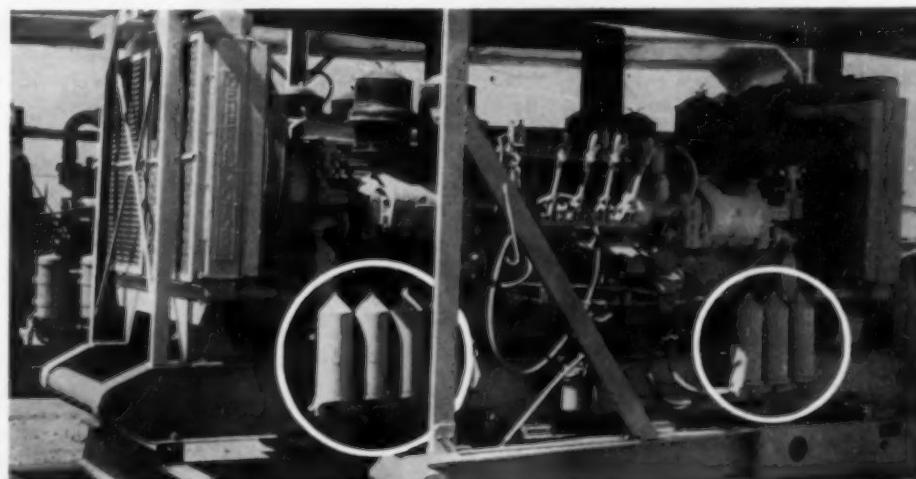
The Florida Keys Electric Cooperative will borrow approximately \$1,300,000 to expand its power plant. Two 3000 kw diesel generating units will be bought and installed at the Marathon Plant with the loan approved by the REA. The new diesel generating units will increase available power to 11,000 kw.

Norwegian Order For Deltic Engines

The Norwegian Government has placed an order with Boatservices Ltd. of Oslo, for 12 fast patrol boats for the Norwegian Navy, each to be powered by two 3,100 shp Napier Deltic 18 high-speed lightweight diesel engines. The boats are 80 ft 4 in. long, have a beam

of 24 ft 7 in., and a displacement of 68 tons. Their speed is said to be over 40 knots. The order is the outcome of an offer by Boatservices Ltd. to build a fast patrol boat in which the Norwegian Navy could test two Deltic engines bought by the Norwegian Government. The new boat, the *Nasty*, proved to be fast and maneuverable and had no difficulty in passing its trials.

HERE IS IMPORTANT INFORMATION!
The completely new 1958 edition of the **DIESEL ENGINE CATALOG**, Volume 23, is now available. If you design, purchase, sell, operate or service diesel, dual fuel or gas engines, the Catalog is essential to you. This giant, 400 page, 10 $\frac{1}{2}$ " x 13 $\frac{1}{2}$ ", fully illustrated reference book has been revised, rewritten and brought up to date completely from cover to cover. Send your order in now for this limited edition, which costs \$10 postpaid plus California sales tax where applicable. Send checks or company orders to **DIESEL ENGINE CATALOG**, 816 N. La Cienega Blvd., Los Angeles 46, Calif.



WINSLOW
Full-Flow
FILTERS

Case History Report No. 37 Shows Why Engines
Protected by WINSLOW FILTERS Last Longer

LUBE OIL KEPT CLEAN A MONTH INSTEAD OF A WEEK with Winslow CP* Filters

Laughlin & Porter Co. of Odessa, Texas, one of the largest Texas oil drilling companies, operates many drill rigs. Power for some electric generators is supplied by a quad installation of four 6-71 GM engines. The engines run 24 hours a day—a real tough test on lube oil—on filters and on engines.

With original filter equipment, oil and element changes were made every week. Since the installation of WINSLOW B-74 Full-Flow Filters, with CP* elements, oil and elements are changed only once a month or after 720 operating hours.

That's important in operating costs, and other big savings are longer engine life and lower maintenance cost, with the use of Winslow Filters. Ask about the application of modern CP* filters for all your powered equipment.

CP* FILTRATION

Winslow patented CP* (Controlled Pressure) elements are designed to continuously self-adjust the pressure within the filter and allow for a full stream of filtered oil without opening by-pass valves. This is accomplished through the dual flow capacity, with two types of material in the same element.

*CP is fully protected by patents and trademarks

WINSLOW

ENGINEERING & MANUFACTURING COMPANY

4069 Hollis Street, Oakland, California

W-2593-A

Michigan-Ohio News

By Jim Brown

WOLVERINE Tractor and Equipment Co. of Detroit and Grand Rapids has sold to Cleo Whiles of Detroit for general construction work an International Harvester TD 14 Diesel Tractor with a hydraulic 'dozer blade.

SEVERAL changes in the Model TC-12 Crawler Tractor have been announced by Euclid Division of General Motors. In the track system, changes include longer-lasting sprockets, improved lubricated idlers, more durable track shoes, wider self-cleaning links and more clearance. Transmission and drive modifications provide simplified servicing through more effective lubrication, improved wearing surfaces and readily accessible location of components. An increase of 30% in the mechanical advantage of brakes has also been made in the TC-12 crawler.

ANDERSON Excavating Co. of Lansing, Michigan has accepted delivery on a model HD6B Allis Chalmers crawler equipped with hydraulic dozer blade. The sale was made by Earle Equipment Co. of Detroit.

THE J. R. Panelli Equipment Co., Inc. of Detroit has sold a Case model 500 Terratrac crawler equipped with a model GD 157 Continental diesel to the Michigan Sewer Construction Co.

TWO Pettibone model 250 3 1/4 yd loaders powered by GM model 4-71 diesel engines and equipped with Speedmatic transmissions were recently delivered to the France Stone Company of Monroe, Mich. The sale was made by Cyril J. Burke, Inc. of Detroit.

THE Saginaw County Road Commission recently bought a new International Harvester TD-18A diesel crawler tractor from Wolverine Tractor and Equipment Company.

CREST Contracting Co. of Dearborn, Mich. has accepted delivery on a model HD6G Tracto-Motive front-end loader. The new loader has a 1 1/4 yd bucket and was purchased from the Earle Equipment Co. of Detroit.

JOHN Cross of Charlevoix, Michigan has purchased a model NH-6-M Cummins Marine diesel engine for his new unnamed boat. The new boat will be about 42 ft in length, and is being built with an all steel hull by T. D. Vinette Co. of Escanaba, Michigan. Twin Disc model MG-165 reverse gears will be used with the engine, with a 3 to 1 ratio. The engine was purchased from Cummins Diesel Michigan Inc. of Dearborn, Michigan.

CARROL G. Turk has been named service manager of The Thew Shovel Co., it was announced by D. L. Douglass, director of parts and service for the Lorain, Ohio firm. He will continue as technical manager, parts and service division.

ONE OF the big new Hough model HUD Diesel Payloaders was recently delivered to Kutchins Paving Company of Lansing, Michigan, by Wolverine Tractor and Equipment Company, of Detroit and Grand Rapids. Another went also to the City of Battle Creek, Michigan.

LEO & Cappello Construction Company of Hazel Park, Michigan has accepted delivery on a model HD6B Allis Chalmers crawler tractor equipped with hydraulic dozer blade. The sale was made by the Earle Equipment Company of Detroit.

THE Boam Construction company of Detroit has purchased from Cyril J. Burke, Inc. a model 95 Northwest 2 1/2 yd pull-shovel. The new shovel is powered by a Murphy 21 diesel engine and will be used on excavation and utility works.

INDUSTRIAL Marine and Supply Co. of Hazel Park, Michigan has recently delivered a model OM-636 Mercedes-Benz 36 hp at 3,000 rpm diesel engine to the Jesick Bros. Ship Yard at Macatawa Beach near Highland, Michigan. The new diesel engine will be used to power a *Newporter 40* 40 ft auxiliary ketch, owned by Allen H. Willard of Grand Rapids, Michigan. Reverse gears are made by Paragon, with 2 to 1 reduction. A Columbian 18x12 bronze propeller will be used, giving her a 7 mph cruising speed. Estimated fuel consumption will be 1 gal. per hour.

A BUCYRUS-Erie 22B Transit crane powered with a GM diesel engine was recently sold to Tom Robinson and Son, Inc., Detroit contractors, by Wol-

verine Tractor and Equipment Company of Detroit and Grand Rapids, Michigan.

M. T. LARDNER Co. of Port Huron, Michigan has recently purchased a 107 kw generator set powered by a Murphy model 21 diesel engine. The set was purchased from Contractors Machinery Co. of Detroit and will be used to power an asphalt plant for the M. T. Lardner Co.

THE MICHIGAN Road Builders' Association has moved to new and larger quarters at 611 West Allegan, Lansing 33, it is announced by C. J. Carroll, executive secretary. Mailing address of the MRBA is P.O. Box 96, Lansing 1, Mich.

JOSEPH Crenshaw of Detroit has accepted delivery on a new International Harvester TD-6 Diesel Tractor with a Drott Skid-Shovel attachment. The sale was made by Wolverine Tractor and Equipment Company of Detroit and Grand Rapids.

TWO model HD6B Allis Chalmers crawler tractors equipped with hydraulic 'dozers have recently been delivered by the Earle Equipment Company of Detroit to Robert Roe of Tipton, Mich., and James Sulaty of Marlette, Mich.

C. A. HULL Co. Inc., bridge contractors from Birmingham, Michigan has recently accepted delivery on a model L-56K7 30 ton Lorain crawler crane. The new crane is powered by a GM 4-71 Detroit diesel engine and is equipped with torque converter. Sale was made by R. G. Moeller Co. of Detroit.

Lightweight Transmissions

Production of 10-speed, semi-automatic Fuller R-96 and R-960 RoadRanger Transmissions with lightweight aluminum alloy housings has been announced by Fuller Manufacturing Company, Kalamazoo, Michigan. Aluminum alloy is used for the clutch housing, front case and auxiliary case and reduces the weight of the R-96 and R-960 RoadRangers by 160 lbs each. This reduced transmission weight permits increased payloads for many over-highway operations. Because of the weight reduction, the R-96 and R-960 (overdrive in 10th) are among the lightest, most compact 10-speed transmissions currently offered the trucking industry. For further information on the R-96 and R-960 RoadRanger Transmissions with aluminum housings, or details on the complete line of Fuller Transmissions, write to Fuller Manufacturing Company, Kalamazoo, Michigan.

ITS NEW

the best costs less

Simplicity is the word for ROOSA MASTER fuel injection pumps. Small in size and weighing less than 10 pounds, there are fewer parts to service, fewer adjustments, which means lower service costs.

Only one model size is adaptable for either a 2, 3, 4, 6 or 8 cylinder engine. Compare its initial cost and installation cost for further proof that the best costs less.

HMS

ROOSA MASTER

makes
good
diesels
better

HARTFORD MACHINE SCREW CO., HARTFORD 2, CONN.
DIVISION OF STANDARD SCREW COMPANY



Member

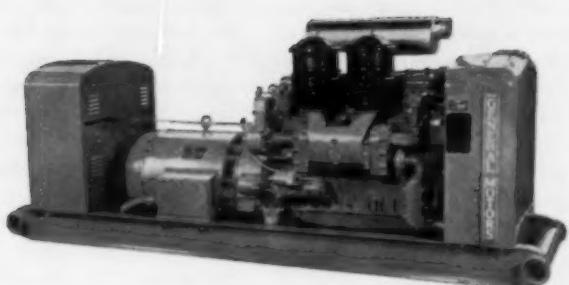
AMERICAN DIESEL INJECTION



Roosa Master pumps
have been proven under
extensive field tests and
years of dependable
service.

YOU CAN DEPEND

ON THE DIESEL THAT DEPENDS ON ROOSA MASTER



OPEN TYPE



CLOSED TYPE

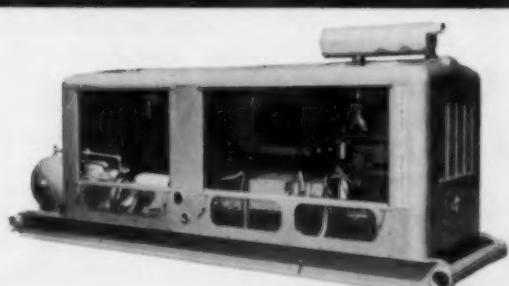


TRAILER MOUNTED

From the world's
most experienced
producers of

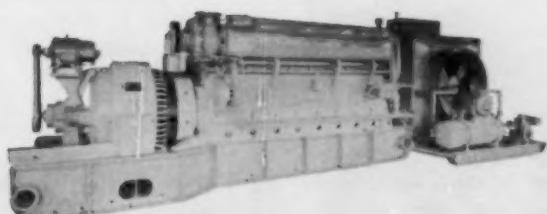
ENGINE GENERATOR SETS

1500 Watts
to 1000 Kilowatts



UTILITY UNIT

450 KW SKID MOUNTED



Stewart & Stevenson provides the most complete range of performance-proved engine generator sets. Combination Oil Field Utility Units, Rig Lighting Plants, A.C. Units, D.C. Units, heat exchanger cooled, radiator cooled, portable or stationary, explosion proof, standard type or custom built for any need.

Select the kind of power you prefer—Diesel, Natural Gas or LPG. Call, write or wire today for complete information on your engine generator set requirements.

STEWART & STEVENSON SERVICES, INC.

Main Office and Plant: 4516 Harrisburg Blvd.,
Phone CApitol 5-5341 Houston 11, Texas
Export: Room 1405, 74 Trinity Place, New York, N.Y.

THE WORLD'S LARGEST DISTRIBUTOR OF DIESEL ENGINES

HEAT EXCHANGER TYPE



Mid-West Diesel News

By L. H. Houck

EMERY Transportation Co., Chicago, has added 20 6-wheeler International, Model DCOF-405, COE's with sleeper cabs to its fleet.

HUBERT Summers, large farm opera-

tor, Sedalia, Mo. has added a Ford diesel tractor to his farm tractor fleet which includes two Massey-Harris diesels, and an International diesel farm tractor.

MARKHAM & Brown, contractors of Dallas, Texas, who are doing revetment and channel work on the Missouri River under two contracts totalling more than \$1 million, installed an In-

gersoll-Rand Drillmaster blast hole drill. This new machine combines both hammer and rotary actions for fast holes. Power is compressed air from an Ingersoll-Rand Gyro-Flo compressor mounted on the machine and powered with a GM 6-71 diesel.

CORPS of Engineers, U.S. Army, has awarded a contract for \$11,722,980 to

Caterpillar Tractor Co., Peoria, Ill., for D8 tractors to be shipped to Corps of Engineers around the world. Contract was awarded on competitive bid in March and the government exercised its option to double order at bid price.

AAA Engine & Electric, Inc., headed by W. J. Hewitt, has installed a 100 kw Waukesha diesel Enginator, powered by a WAKDBS 1197 cu in. Waukesha diesel at the new hospital at Richards-Gebaur Air Force Base. It is used for standby power.

WATTS Grain Exchange, Emmetsburg, Ia., has put two Mack B-61 Thermodyne diesels in its grain hauling service. Units were purchased in Sioux City from Jerry Wilson, Sioux City Truck Sales, Inc.

RALPH E. Johnson, Mishawaka, Ind., has repowered an Autocar DC 75 T with a 190 hp Cummins HRF diesel from Cummins Diesel Sales Corp., Indianapolis.

CUMMINS Diesel Sales Corp., Denver, installed a 175 hp JT Cummins in a White COE tilt, used in van service by the Bekins Van & Storage Co., Denver.

LIST & Clark, Kansas City heavy contractors, recently added three new Euclid TD-24 Twin-Power scrapers to its large fleet. The new units which have a GM 6-71 diesel in front and a 6-110 in the rear, were assigned to their highway job near Junction City, Kan.

PETTIS County Highway Dept., Sedalia, Mo., recently added a couple of No. 12 Caterpillar motor graders to its equipment fleet, from Dean Hobson Co., dealers, Kansas City.

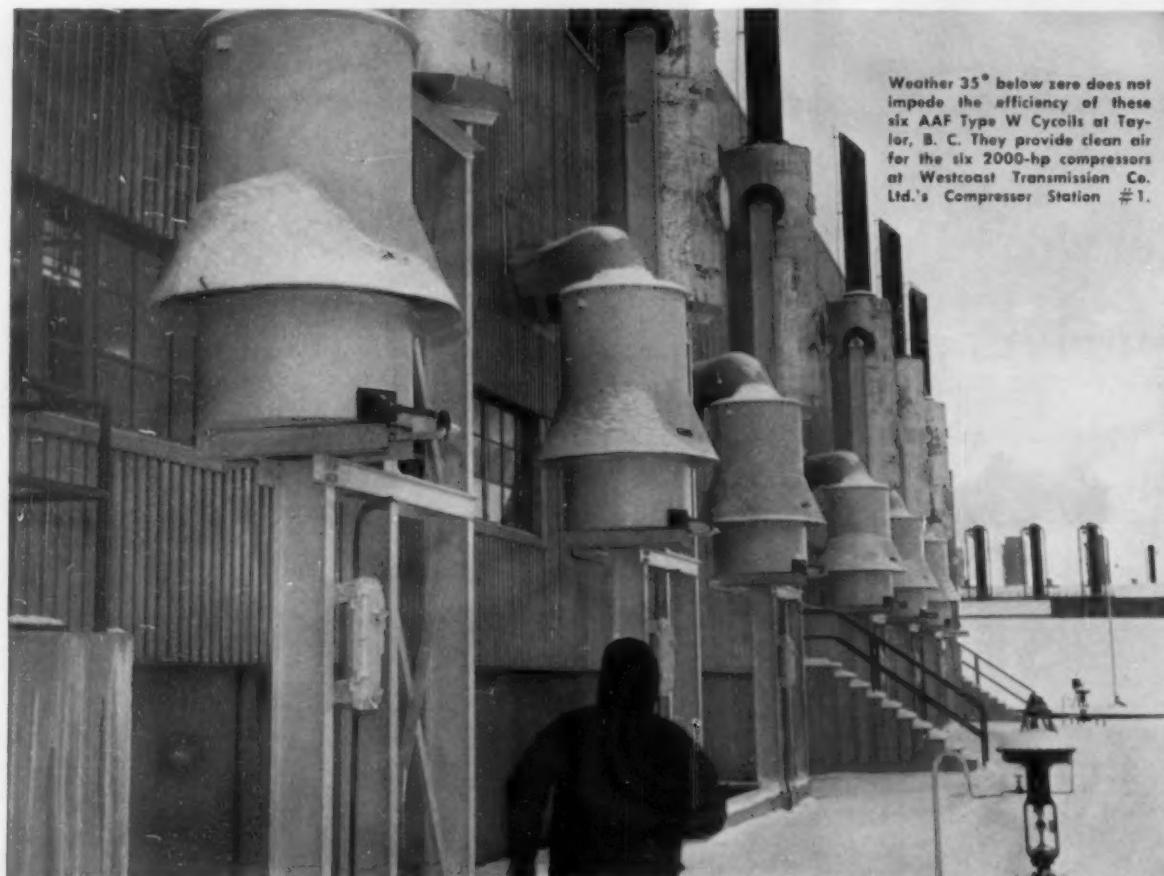
SAM'S Mining Co., iron ore miners, Piedmont, Mo., bought a 75 hp J-4-I Cummins diesel from Cummins Mo. Diesel Corp., St. Louis, to power a water pump.

W. J. LAZYSKI Construction Co., Milwaukee, has powered a big air compressor with a 335 hp Cummins, NRTO-6-P from Cummins Diesel of Wisconsin, Inc., Milwaukee.

A PAIR of Diamond T's, a 921 and a 723, with Cummins diesels went into produce hauling service for Joe Gatewood, South Sioux City, Ia., who hauls to the West Coast.

CHILES Tractor & Machinery Co., Springfield, delivered an Allis-Chalmers HD-11-B dozer to E. N. Dencil, Sunrise Beach, Mo., for use in resort landscaping and contracting.

INTERSTATE Motor Lines, Inc., Den-



Weather 35° below zero does not impede the efficiency of these six AAF Type W Cyc coils at Taylor, B. C. They provide clean air for the six 2000-hp compressors at Westcoast Transmission Co. Ltd.'s Compressor Station #1.

COLD...but CLEAN...CYCOIL air helps power Canada's Big Inch

Westcoast Transmission Co., Ltd.'s Compressor Station #1—initiating station of Canada's new seven-station, 17-compressor, 52,500-hp Big Inch Line—is the northernmost complex of its kind in the western hemisphere. Here British Columbia "sour" gas is "sweetened", compressed, and started on its journey toward the U. S. border, more than 750 miles away.

Despite bitter cold, AAF Type W Cycoil oil-bath intake air filters efficiently and uninterrupted provide clean air for the safe operation

of six 2000-hp gas engines. The only concession to the cold—which sometimes reaches 50 below zero—is the use of Arctic-type oil!

Whether your operation is in the frozen north, a temperate region, or a hot and dusty desert... whether the application is pulsating action or smooth flow, packaged or stationary units, automatic station or not... AAF has filters engineered to match your requirements. For complete information, call your nearest AAF representative; or, write direct for Bulletin 130.



American Air Filter

COMPANY, INC.

408 Central Avenue, Louisville 8, Kentucky
American Air Filter of Canada, Ltd., Montreal, P. Q.



BETTER AIR IS OUR BUSINESS

ver, installed a Cummins NH 220 diesel in a Peterbilt 351 COE in a repowering operation. Details were handled by Cummins Diesel Sales Corp., Denver.

TSC MOTOR Freight Lines, headquartered at Houston, a division of the Ryder Lines, has added 40 Mack diesel tractors to its fleet.

LEONARD Merideth, Ruter, Mo., has added an Allis-Chalmers HD-11-B with dozer to his spread.

HIGHWAY Machinery Co., Waukesha, Wis., bought a 240 hp HRS-6-P from Cummins, Milwaukee, to power a portable rock crusher.

KOSS Construction Co., Des Moines, specializing in concrete paving for highways, recently added a Caterpillar No. 12 motorgrader from E. A. Martin, dealer, Springfield, Mo., to its large fleet of diesel powered equipment. The unit went to a 10-mile paving job in Johnson county.

Mechanical Sound Detector

A new, deluxe model Binaural Engineer's Sound Detector makes it possible to locate the smallest internal defects in moving machinery without shutting down or otherwise taking equipment out of service, according to the manufacturer. This lightweight, completely portable detector amplifies normally inaudible defect-caused noises and helps the user to accurately locate broken, loose, worn or bent parts in engines, gear boxes, compressors, pumps and similar equipment, regardless of size. It is also useful in determining the efficiency of steam traps and for locating leaks in air, gas or liquid lines. The Binaural Engineer's Sound Detector utilizes dual detectors to transmit sounds to one or both ears as desired. Each detector contains both a pick-up diaphragm and an amplifying diaphragm to provide maximum sound vibrations. The unique twin detector feature makes it possible for the engineer or maintenance man to listen to two different points at the same time.

When used on any type diesel engine, the extreme sensitivity of the instrument enables the user to correctly diagnose sounds caused by scored cylinders, bent shafts, worn bearings, excessive play or lack of lubrication. Worn brushes, foreign matter, pitted shafts or bearings can easily be distinguished in electric motors, as can stuck or leaking valves in compressors and pumps. Early detection of such danger signals eliminates the problem of sudden equipment failure, minimizes costly downtime and permits systematic scheduling of necessary repairs. A pair of extension rods

are furnished with each Binaural Engineer's Sound Detector for reaching into remote places. An interchangeable bell stethoscope is also supplied to detect pressure or vacuum leaks around head gaskets, manifolds, mufflers, etc. Metal parts are chrome plated for long wear, and hose and ear plugs are made of soft, durable rubber. Each unit is fully guaranteed. The detector may be

put together or disassembled in a matter of seconds and the entire assembly fits compactly into a Redwood case. The new Deluxe model sells for \$22.50 shipped insured parcel post prepaid anywhere within the continental U.S.A. An eight page booklet on its use is included. For further information write Burke & Company, Worton, Maryland.

ITS NEW

HERE IS IMPORTANT INFORMATION!
The completely new 1958 edition of the **DIESEL ENGINE CATALOG**, Volume 23, is now available. If you design, purchase, sell, operate or service diesel, dual fuel or gas engines, the Catalog is essential to you. This giant, 400 page, 10½" x 13½", fully illustrated reference book has been revised, rewritten and brought up to date completely from cover to cover. Send your order in now for this limited edition, which costs \$10 postpaid plus California sales tax where applicable. Send checks or company orders to **DIESEL ENGINE CATALOG**, 816 N. La Cienega Blvd., Los Angeles 46, Calif.



Now—test spray pattern, valve opening (pop) pressure, holding pressure and high pressure according to factory specifications for unit-type Series 71 injectors.

The J7509 Tester's exclusive Quick Clamp fixture design puts GM Diesel injector testing on a production basis. Change-over from standard bod' injectors to off-set (4-valve head) types is simplified with interchangeable support plates.

Developed in cooperation with Detroit Diesel Engine Division, the Kent-Moore J 7509 Injector Tester equips you for the latest revised overhaul procedures. Injector Tester for Series 71 injectors is priced at \$195. See special offer below.

Check these 7 Kent-Moore features

- Clear plastic container for safe, full-view observation of spray pattern.

NEW! GM DETROIT DIESEL INJECTOR TESTER

**Improved Kent-Moore
Tester performs 4
factory-recommended
tests quickly,
accurately to latest
specifications!**

Special trade-in offer

SAVE UP TO \$75!

Credit given for your obsolete pump-type injector tester, regardless of make, model or condition, on the purchase of the J 7509 Tester. But act now! Trade-in offer good for limited time only. Write direct for details.



KENT-MOORE

ORGANIZATION, INC.

28635 MOUND ROAD, WARREN, MICHIGAN

ENGINEERS AND MANUFACTURERS OF SERVICE TOOLS AND EQUIPMENT

58-D3

<p>J 7510 ADAPTOR KIT FOR SERIES 110 INJECTORS</p> <p>Includes Quick Clamp mechanism and support plates to convert the J 7509 Tester for servicing Series 110 GM injectors. Price, \$57.50. Adapter Set for Series 51 Injectors also available.</p>	<p>J 6868 INJECTOR ASSEMBLY FIXTURE</p> <p>Allows fast, easy assembly and disassembly of Series 71 injectors without damage to parts. A factory-approved accessory. \$57.50.</p>	<p>J 7505 JAWS AND SUPPORT ASSEMBLY, SERIES 110 INJECTORS</p> <p>Interchangeable jaws permit the same quick, correct servicing of Series 110 injectors with the Kent-Moore J 6868 Fixture. Only \$15.95.</p>
--	---	---

Inland River Reports

By A. D. Burroughs

THE 146 x 29 ft towboat, *Robert E. Reed*, is now in service for Wheeling Steel Corp., W. Va. The twin-screw craft, recently delivered by St. Louis Shipbuilding and Steel Co., is equipped with GM Cleveland Model 12-567C engines for the rated 2,000 hp.

THE *Sumter*, new 55 ft tug recently completed by Bryant Boats, Inc., Ala., has captured inland interest as the first aluminum tug built in the U.S. Twin GM Detroit 6-110's supply push power performing for Kaiser Aluminum and Chemical Co., in Louisiana oil fields.

THE multipurpose craft, *Robinson Bay*, has the special distinction of being the first tug built for St. Lawrence Seaway Development Corp. The tug, designed for general pulling performance plus the duties of ice-breaking and fire-

fighting, was completed by Christy Corp., Sturgeon Bay, Wisc., and is powered with GM Cleveland diesel-electric drive for the rated 1400 hp.

A Superior engine developing 520 hp gives the dependable power performance evident in the new tug-towboat, *Harbor King*. Built by Sturgeon Bay Shipbuilding and Dry Dock Company for Chicago Towing Co., the 83 x 24 ft vessel has auxiliary power from two 20 kw Caterpillar generators.

THE NEAT *Sally Estelle*, 57 x 18 ft towboat owned by McAlister-Davis Co., Memphis, Tenn., makes a new claim to fame as the first river towboat to be powered with twin Cat D 353 engines, with sale and installation of the two new 290 hp Caterpillar engines handled by the Taylor Machinery Co., Memphis.

THE NEW 48 x 16 ft twin-screw towboat, *Leopard*, has been purchased from Humboldt Boat Service, St. Louis, by

Kenova Terminal Co., W. Va. Recorded as the largest boat yet completed by Humboldt, power is supplied by twin GM Detroit 6-110's.

BIG TOWS became news as the cargo of 24,000 tons of coal was pushed through the Granite City, Ill. lock, by Mid-America Transportation Company's big beauty, the *Eleanor Gordon*. The 1957 towboat relies upon push power from GM Model 8-498 engines for the rated 4800 hp.

OLDER vessels shared the profitable-performance publicity, too. The *Aztec*, normally in southern waters, was sighted on the upper Ohio downbound with empties. The 1948 Sturgeon Bay edition has a rated 2700 hp from Enterprise DMQ-36 engines installed in 1954.

ON THE Upper Mississippi waterways, the *Carcrosse* was reported downbound with a good-size grain tow. Built in 1956 by St. Louis Ship for Cargo Carriers, Inc., Minneapolis, the 150 ft towboat has ample power provided by the two Cooper-Bessemer engines for the rated 2400 hp.

THE *L. W. Sweet* was downbound, locking through at Keokuk, for owners Pure Oil Co. Formerly named the *R. H. McElroy*, the towboat is a 1950 production from Sturgeon Bay Shipbuilding Co., and gets its rated 2900 hp from a pair of Fairbanks-Morse 10 cyl engines.

MANITOWOC Shipbuilding, Inc. is doing the face-lifting and re-powering work on the Ann Arbor Railroad car ferry #6. New power will come from two Nordberg V-type diesel engines, delivering a speed of about 17 mph.

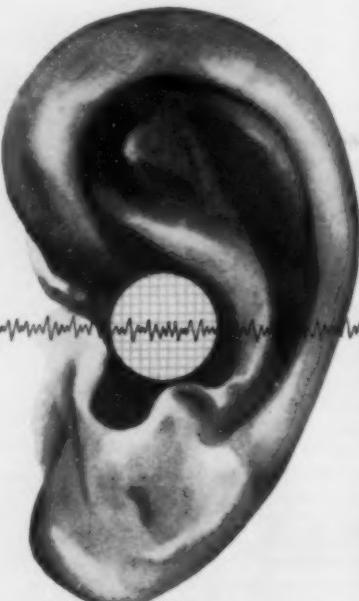
WE'RE pleased with the photo of one of the prettiest plying inland rivers, the 1956 *Joey*, built by Bryant Boats, Inc. for Capt. Leonard, Golden Meadow, La. The neat 60 ft towboat has 800 hp from a pair of Allis-Chalmers engines, Avondale Propellers, Western Gear reduction gears, and Allis-Chalmers generators.

ITS NEW

U. S. Distributor For Test Equipment

Diesel Injection Sales & Service, Inc., 808 Union Street, Norfolk, Virginia, has been appointed exclusive distributor in the United States for Leslie Hartridge, Ltd., of England, manufacturer of fuel injection test and service equipment. The firm manufactures a wide range of universal diesel test and service equipment in the world. As American distributor, Diesel Injection Sales & Service, Inc., will offer the full line of Hartridge equipment, which includes nozzle analyzers, testers, reconditioning equipment, fuel pump test benches, calibrators and service equipment.

**HEAR
THE
DIFFERENCE
A MAXIM
MAKES**



Compressor station is quieted with Maxim Silencers.



The difference is apparent not only in superior noise suppression, but in the services Maxim provides. Quick consultation on your silencer projects — there's a Maxim man near you. Quick delivery — many sizes and types from stock. Experienced field engineers to help you complete silencer installations quickly, economically and efficiently. Files up-to-date? Make sure. Write for "Guide to Maxim Silencers."

THE MAXIM SILENCER COMPANY

Subsidiary of Emhart Manufacturing Company
84 Homestead Avenue, Hartford, Connecticut

IN ANSWER to the inquiry regarding the Ohio River Company fleet, the 1955 fleet additions did include towboats of single-screw, twin-screw and triple-screw type, all with the same size and make engines. All are powered with Baldwin-Lima-Hamilton engines, with the single-screw the *Tom Ragsdale*; the twin-screw, *A. L. Long*, and *Mike Creditor*; the triple-screw, *John J. Rowe* and *Walter C. Beckjord*.

RIVERFOLKS on hand at St. Louis watched the towboat, *Crescent City*, bring in the first barge shipment of

Supercharger Folder

A new four-page folder demonstrating the operating advantages of pressure range, size weight, cost and service of the Miehle-Dexter Supercharger for internal combustion engines has been issued by the Miehle-Dexter Supercharger Division, 100 Fourth Street, Racine, Wis. Operating at pressure ranges from 1 to 12 psig, the M-D Supercharger boosts power up to 50% in engines having un-supercharged ratings of 100 to 750 hp. Capacities range upward to 2,500 cfm. In addition to the compact, light-weight 3-lobe rotary positive design, other features are a patented synthetic rubber grid-seal on the end plate to eliminate metal-to-metal contact and Formica rotor wear-strips to provide maximum volumetric efficiency.

\$2,000,000 Engine Order

American MARC Inc. has received a contract amounting to approximately \$2,000,000 from the U.S. Defense Department, Denis Kendall, president of the California manufacturer of diesel engines and generators announced recently. The order for nearly 2000 light weight, air-cooled 1 cylinder, 6½ hp Model AC-1 and 2 cylinder 13½ hp Model AC-2 diesel engines is the first contract received by American MARC since these engines were standardized as technical commercial type military equipment. The engines will be used as portable power packages and prime power for electronic installations. Production of the engines is underway and completion of the contract is scheduled for early 1959.

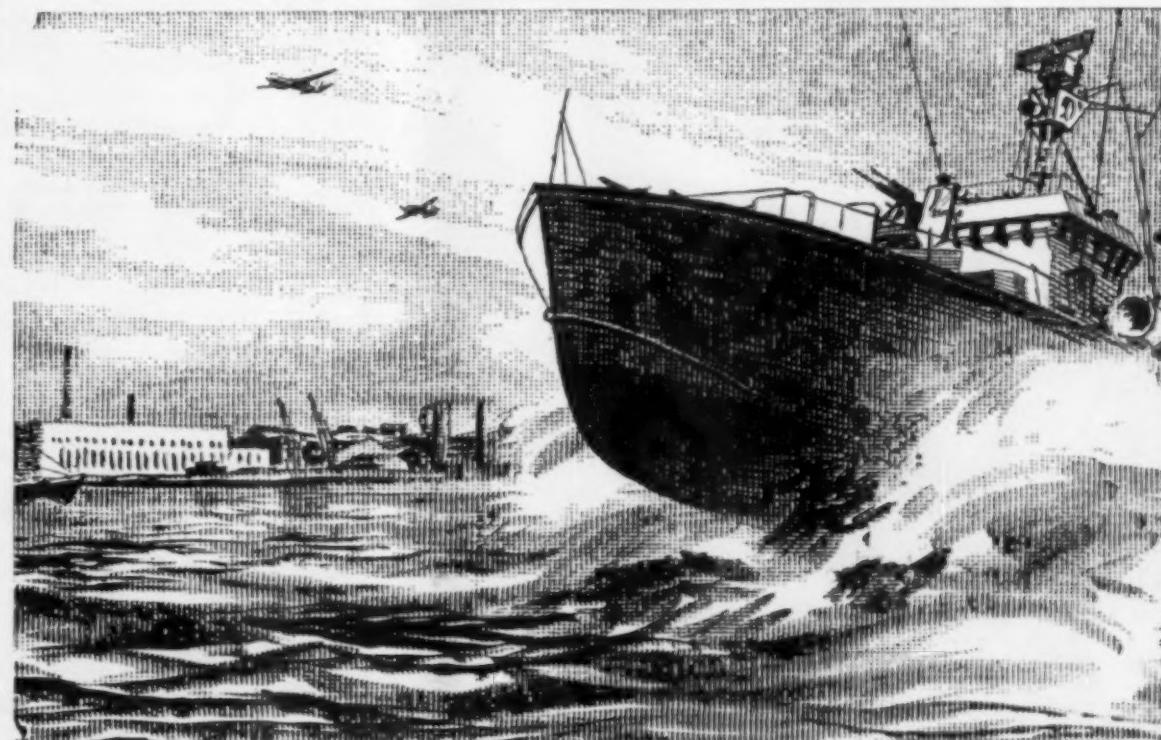
President and Chairman Elected

The board of directors of Alco Products, Inc. has announced the election of Perry T. Egbert as chairman and William S. Morris as president. Egbert had been president of the company and Morris executive vice president. Egbert and Morris had held their former offices since December 1, 1952. Both are career Alco executives. Egbert joined the company in 1920 and served in production, sales and engineering capacities until he was named a vice president in 1944. From 1921 to 1924 he was Alco's technical representative in the Far East. In 1929 Egbert was put in charge of development of a new diesel engine designed especially for the railroads, and five years later he was named manager of railway diesel sales when that Alco division was formed. In that capacity he helped pioneer the application of diesel-electric locomotives on the nation's railroads. After he became a vice president in 1944, Egbert led Alco's conversion from steam to diesel locomotive production, a changeover that was com-

pleted in 1948. He subsequently directed the engineering and production of Alco's current line of diesel-electric locomotives. Morris began his Alco career as a special apprentice at Schenectady in 1922, following Army service from 1917 to 1918 and graduation from the United States Naval Academy in 1922. He subsequently worked as a sales representative and later district man-

ager at Chicago. In 1940 Morris was elected vice president of Montreal Locomotive Works, and he became executive vice president of that firm in 1944. Later the same year he transferred to Alco's New York offices as vice president. Morris has been responsible for the operation of Alco's four product divisions since they were created under a decentralization plan in October, 1956.

HERE IS IMPORTANT INFORMATION!
The completely new 1958 edition of the **DIESEL ENGINE CATALOG**, Volume 23, is now available. If you design, purchase, sell, operate or service diesel, dual fuel or gas engines, the Catalog is essential to you. This giant, 400 page, 10½" x 13½", fully illustrated reference book has been revised, rewritten and brought up to date completely from cover to cover. Send your order in now for this limited edition, which costs \$10 postpaid plus California sales tax where applicable. Send checks or company orders to **DIESEL ENGINE CATALOG**, 816 N. La Cienega Blvd., Los Angeles 46, Calif.

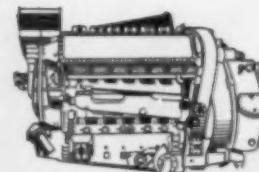


MORE POWER AT LOWER COST— THIS IS NAPIER



GAZELLE 1200-2000
s.h.p. Free Turbine:

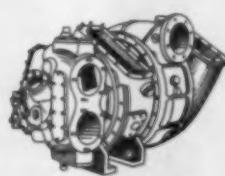
designed for strenuous duty and long service between overhauls.
Chosen for R.N. and R.A.F. helicopters. Allows new flexibility in helicopter design. Its simplicity means economical and speedy maintenance.



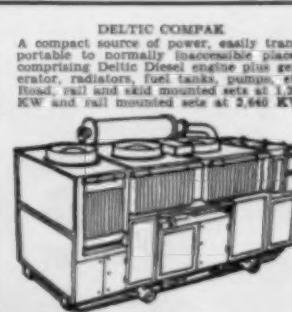
DELTIC 9 or 18 cylinder Diesel:
engine for merchant ships. Powers fast patrol boats and mine-sweepers of many Navies, police and passenger launches and the world's most powerful diesel electric locomotive. Deltic Diesel Engines are designed for power outputs from 825 to 3,100 h.p.



ELAND 3000-4000
e.h.p. Turbo Prop:
heralds a new era of economy for the airline operator and cheaper fares for the air traveller.
The Eland powers the Canadair 540 Airliner, the Fairey Rotodyne and the Westland Westminster Helicopter.



TURBO BLOWERS:
available in seven sizes for diesel engines afloat and ashore. Napier blowers give maximum power increase with low fuel consumption. Now in service in 34 countries.



DELTIC COMPACT:
A compact source of power easily transported by road or rail. It consists of a power unit comprising Deltic Diesel engine plus generator, radiators, fuel-tanks, pump, etc. Road, rail and skid mounted sets at 1,200 KW and rail mounted sets at 2,640 KW.

NAPIER ENGINES INC.

Suite 909, Dupont Circle Building, 1346 Connecticut Avenue N.W., Washington 6, D.C. Telephone: North 7-9300
A subsidiary of D. NAPIER & SON LIMITED - LONDON - ENGLAND
Partners in Progress with The ENGLISH ELECTRIC Company Ltd.

CRC154

Mid-Continent Diesel News

By Jack F. Cozier

M. J. CROSE Mfg. Co., Inc., Tulsa, Okla., purchased a 150 kw Delco diesel generator set from the Diesel Power Co., Tulsa. The unit is powered by a series

6-110 GM diesel engine and will be installed on a Price-O-Matic fully automatic double joinder. The 60 cycle, 440 volt generator has no brushes.

ST. LOUIS Shipbuilding & Steel Co., St. Louis, Mo., has bought two Fairbanks, Morse eight cylinder, 600 hp each, model 38F5½ marine diesel engines.

PERFORMANCE



Satin smooth more RUGGED than a boom boat

Here is the perfect mate for the modern marine diesel...with every desirable feature to provide satin smooth power with utmost reliability. The S-N 3900 Series Hydraulic Gears, with responsive finger-tip control, transmit full load and speed either ahead or astern with no loss of power due to clutch drag. Simple compact design...extremely rugged construction...easiest to service...low price per horsepower...and widest choice of reduction gear ratios are but a few of the reasons why more operators specify S-N 3900 Series for new installations or repowering. For complete information see your S-N distributor or write direct. The Snow-Nabstedt Gear Corporation, Hamden, Connecticut.



SNOW-NABSTEDT

Transmission Engineers FOR OVER HALF A CENTURY

PIPELINE Service Co., Seminole, Okla., has purchased two Unit ½ yd cranes powered by GM 3-71 diesel engines for pipeline construction work. The sale was made by Midwestern Engine & Equipment Co., Tulsa, Okla.

SPICERS, Inc., Oklahoma City, Okla., has bought a John Deere 820 diesel tractor from Oklahoma City Equipment Co., pulling a Hancock eight yd scraper.

LAYTON Oil Co., Independence, Kan., bought an International UD-16 diesel engine from Carson Machine & Supply Co., Tulsa, Okla., for use on a mud pump on a drilling rig in Creek county, Okla.

ENGINEERS Ltd. Pipeline Co., Mechanicsburg, Penn., is operating a model 320 Cleveland trencher with a Cat 831 diesel engine from Leland Equipment Co., Tulsa, Okla.

R. R. TWAY, Inc., Oklahoma City, Okla., purchased a model 44 Lima crane from R. A. Young & Son, Inc., Oklahoma City for bridge work near Perry, Okla. The unit is powered with a GM diesel engine with Allison torque converter.

MC BOAT Co., Morgan City, La., has a new tug in operation powered by a Cummins marine engine equipped with Capitol hydraulic reduction gears. The engines were sold by Cummins Sales & Service, Inc., New Orleans, La.

McMICHAEL Construction Co., Tulsa, Okla., bought a Euclid TS-24 twin powered scraper from Butler Sparks Equipment Co., Tulsa. The unit utilizes a GM series 6-110 diesel engine and a GM series 6-71 diesel engine in excavation work on the new St. Francis hospital in Tulsa.

Sealing Ring Brochure

The Metal Products Division of Koppers Company, Inc., has announced publication of a comprehensive eight-page brochure on the performance and use of metallic sealing rings. The brochure points out that use of these rings is rapidly increasing because they will withstand both high temperatures and high pressures and assure a minimum amount of leakage. Included in the brochure are illustrations and definitions of the four major types of sealing rings as well as a discussion of the combinations of materials used in rings made by Koppers Piston Ring and Seal Department. Drawings showing typical applications of metallic sealing rings are also included. Of particular interest to design engineers is a four page specification table on the most widely used sealing rings, which is offered with the brochure. According to the company,

this is the first time such a table has become available. Copies of both the brochure and specification table can be obtained by writing to: Publications Section, Koppers Company, Inc., Metal Products Division, 200 Scott St., Baltimore, Md.

Oil Seal For Overhead Valves

Perfect Circle Corporation engineers have developed a seal that reportedly eliminates oil loss through valve guides in overhead valve engines. Valve seals for popular makes of trucks have been released to the replacement market and are under study by original equipment makers. The new valve seal has been two years in development and grew out of the company's continuing study of oil control problems in modern, high compression engines. The new device consists of a Teflon seal encased in a Buna-N synthetic rubber jacket with a retainer ring. It eliminates oil loss by forming a positive seal between the valve stem and guide. Assembly and packaging of the product is being handled at the company's new distribution center opened last fall.

ITS NEW

Eaton Plans To Acquire Fuller

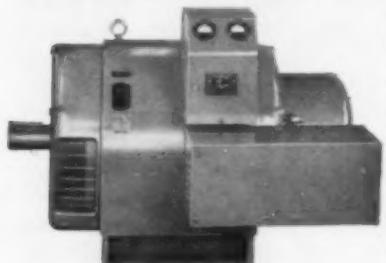
Eaton Manufacturing Company, a producer of power-driven rear axles for medium and heavy-duty trucks and off-the-road equipment among other automotive products, proposes to acquire the Fuller Manufacturing Company of Kalamazoo, Michigan, whose principal product line consists of transmissions for these vehicles. Directors of the two companies, in separate meetings recently, agreed on an exchange of each outstanding share of Fuller for one Eaton share, subject to the approval of shareholders of both companies, according to John C. Virden, Chairman and President of Eaton, and J. Seton Gray, Chairman and Chief Executive Officer of Fuller, in a joint statement following the meetings. Fuller has 458,310 shares outstanding and Eaton has 1,838,044 shares of an authorized issue of 2,500,000. The proposed transfer of Fuller assets to Eaton, including the outstanding stock of the former's wholly-owned subsidiary, the Shuler Axle Company of Louisville, Ky., and the proposed acquisition of these assets by Eaton were submitted to the shareholders of both companies for action at separate meetings July 30, Messrs. Virden and Gray stated.

Upon consummation of the transaction, Fuller would be operated as a wholly-owned subsidiary of Eaton with no changes contemplated in its present management, personnel, products and sales policies. In their announcement, Messrs. Virden and Gray said: "Fuller Manufacturing Company's business is

complementary to that of Eaton's. The proposed acquisition would result in broadening Eaton's base of operations into completely new lines that are closely related to its present products. The complementary resources, research, engineering and manufacturing know-how will place both companies in a position to make even greater contributions to the truck and off-the-highway equipment.

Get the latest! A COMPLETELY NEW "PACKAGED" GENERATOR

AMP-PAK



AMP-PAK Generator shown is rated at 187 kva, 1200 rpm, 240/480 volts. AMP-PAK is available in ratings of 75 thru 187 kva at 1800 rpm and 62½ thru 187 kva at 1200 rpm. Three phase, 80% PF, 60 cycles, 50C rise, and 120/208, 240 and 480 volts.

No exciter...No moving parts in the voltage regulator

AMP-PAK is a compact, revolving field a-c generator with built-in, static excitation system; static voltage regulator; and basic metering and controls conveniently grouped. AMP-PAK is a portable unit, factory assembled, internally connected, and tested.

No rotating exciter to maintain. D-C excitation is provided by a heavy duty, long-life, static rectifier.

No tubes, relays, vibrators to service. Voltage is regulated by a static, E-M developed sensing circuit and "magical" magnetic amplifiers.

Holds voltage "rock-steady" so your motors, lights, and electronic equipment will work better. The static regulator provides ±2% regulation.

Starts big motors. A special, built-in voltage booster transformer stands by to reinforce line voltage when heavy loads are suddenly applied.

Easy to install. Needs no switchboard. Just connect load to AMP-PAK thru a suitable line switch.

Simple to operate. Has no belts, no "tricky" commutator, no adjustments — anyone can operate AMP-PAK.

See your nearest E-M Sales Engineer and write the factory for publication PRD-236.



ELECTRIC MACHINERY MFG. COMPANY
Minneapolis 13, Minnesota

Largest manufacturer of "Packaged" Generators
2100-TPA-2154

ment manufacturing industry in the years ahead. Major integrated and independent manufacturers in this industry presently offer both transmissions and power-driven rear axles to their customers and it is desirable that Eaton and Fuller be in a similar position to meet this competition," the statement added.

New Truck Diesel

The Cummins NH-195, a 195 hp diesel designed for express service hauling 55,000-60,000 lbs GCW, has been announced by Cummins Engine Company, Inc. C. R. Boll, Vice President - Sales, announced introduction of the Cummins NH-195 at a national meeting of Cummins distributor sales representatives at Indianapolis, Indiana recently. Boll said the NH-195 was introduced to give truck operators an engine between 180 and 220 hp with a low average fuel consumption per ton-mile. The NH-195, according to Boll, will meet the higher horsepower demands of operators in the Central and Eastern parts of the United States, where revised weight and length laws permit greater payloads and where new toll and express highways permit higher speeds. The Cummins official told the sales representatives that the trend to diesel is continuing as reflected by the total diesel registrations for the first three months of 1958 which are up 6 per cent, whereas heavy-duty gasoline truck purchases were down over 16 per cent over the same period.

Basic components of the NH-195 are the same as those of the long-popular Cummins NH-220 and the recently-introduced NH-180. The NH-195 is rated at 195 hp at 2100 rpm. It has a 4½ x 6 in. bore and stroke, 672 cu in. displacement, 535 ft lbs peak torque and exhaust temperature of 1,100 degrees. Like the NH-180 and the NH-220, the Cummins NH-195 features wet-type cylinder liners, the Cummins PT fuel system and a 4½ in. diameter crankshaft. Two intake and two exhaust valves provide easy breathing for complete fuel combustion.

ITS NEW

New, Reinforced Gasketing Material

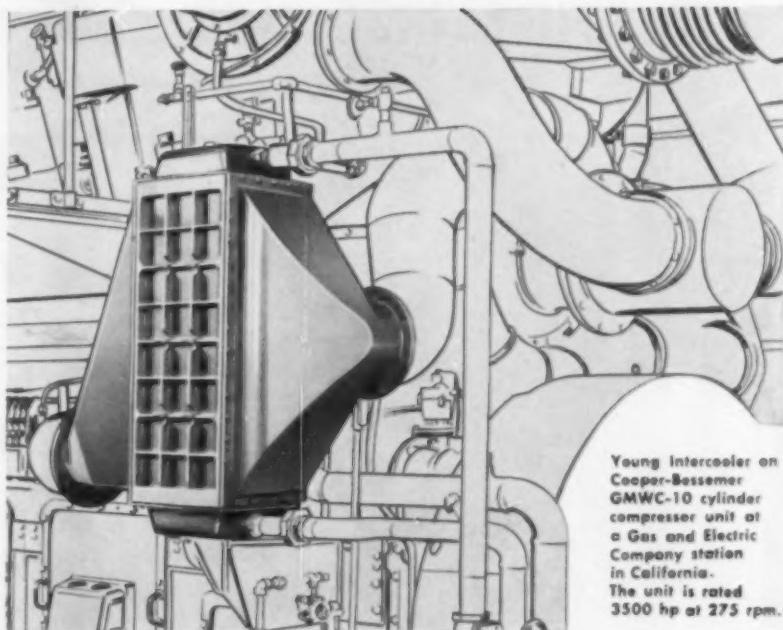
A new rubber-asbestos material called Kaobestos is being introduced by F. D. Farnam Co., Chicago manufacturer of gaskets and gasketing materials. Improved conformability and tight sealing qualities with minimum flange loadings are reported to give this material a wide range of applications. Gasketing for heat exchangers, compressors, diesel engines, and the automotive field are among those requiring high quality materials with the features provided by Kaobestos. This new material is produced under

the patented Kao process, which uniformly disperses and coats millions of individual fibers per ounce of asbestos as prepared for this sheet material. Among the unique features reported of this material are the absence of high and hard spots. Kaobestos is presently available in two grades of GRS, in Buna N, and in Neoprene. Sheet sizes range up to 60 in. square; standard thicknesses from .015 in. to .125 in. Heavier thicknesses can be laminated. Representative die cut gaskets, as well as sheet materials are available. Detailed information on Kaobestos and listings of the various grades and applicable ASTM, SAE, and MIL specifications are obtainable on request from F. D. Farnam Co., 4940 West Flournoy Street, Chicago 44, Illinois.

ITS NEW

Young INTERCOOLERS

help get maximum efficiency from turbocharged engines



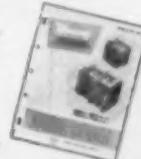
Young Intercooler on Cooper-Bessemer GMWC-10 cylinder compressor unit of a Gas and Electric Company station in California. The unit is rated 3500 hp at 275 rpm.

Young engineering pays off with more power, more efficiency

Here is another specific example where quality and dependability count . . . Young gets the job. Many manufacturers in the Diesel industry look to Young Creative Heat Transfer Specialists for the product-answers to cooling problems. High and low pressure intercoolers by Young are used on stationary engines, marine engines, locomotives, oil pumping stations and natural gas compressors throughout the world. Young quality starts at the design of the intercooler cores themselves — laboratory tested and scientifically designed to furnish the maximum heat transfer with a minimum restriction of air flow.

Intercoolers are only one of the many Heat Transfer products produced by Young. Why not put Young engineering to work for you — and solve your heat transfer problems now?

Write Dept. 408-H for Catalog 1652





RADIATOR COMPANY
RACINE, WISCONSIN

Creative HEAT TRANSFER ENGINEERS
Executive Office: Racine, Wisconsin, Plants at Racine, Wisconsin, Mattoon, Illinois

**Market Development
Committee Chairman**



C. E. Dietle

C. E. Dietle, Manager of the Diesel Division of Fairbanks, Morse & Co., has been elected chairman of the Market Development Committee of the Diesel Engine Manufacturers Association. Mr. Dietle, who has been vice-chairman for the past year, assumed the duties of chairman June 11th.

Having joined Fairbanks, Morse & Co. in 1931, he has been Manager of the Diesel Division since 1952.

Test Stand For Small Engine Governors

Hill Machine Company, 1301 Eddy Ave., Rockford, Ill., has developed and are now manufacturing an Air Operated Test Stand for hydraulic governors of either speed droop or isochronous types as used on small diesel engines. The stand is especially designed for, and equipped with adaptors for, the SG and PM Series governors made by Woodward Governor Company. Adaptors can also be furnished for other governors of similar sizes and types. The purpose of the Test Stand is to perform all the functions necessary for checking a governor completely after overhaul and rebuilding. The stand has a self-contained, temperature-controlled oil supply to simulate normal operating conditions for hydraulic governors, and also to

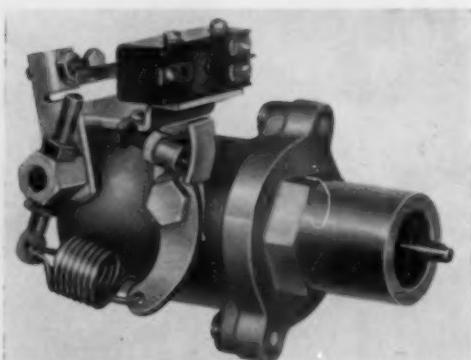
supply means for checking relief valve pressures. The governor is driven by an air motor with a speed range of 0-5000 rpm, the operating speed of which is actually controlled by the governor on test and indicated by an electric tachometer. Suit-



able linkage adaptors are furnished for both terminal shaft and fuel rod types of governors. Two models of the Test Stand are available, one with and one without a Weston Percent Tachometer. This type of tachometer is necessary when checking speed droop of a governor on test. A slow-speed auxiliary drive system is incorporated to duplicate engine cranking speeds, and is variable from 150 to 450 rpm, by a panel control. The only connections required to ready the Hill Test Stand for use are 220 volt, 60 cycle, single-phase current at 20 amperes maximum load, and 100 lb air pressure with a $\frac{1}{2}$ in. connection.

ITS NEW

New Overspeed Governors



The Pierce Governor Company, Inc., Anderson, Indiana, announces the release of a new series of centrifugal switch governors for use as overspeed protection or any switch sequencing operation involving the operation of single or multiple circuits relative to speed. Compact design minimizes interference problems and the simplified mounting permits quick installation on any $\frac{1}{8}$ -18 tachometer outlet. This mounting feature greatly reduces installation costs from the standpoint of both time and material by eliminating costly brackets and driving mechanisms. Switch equipment can be provided for all common electrical current ratings for normally open or normally closed circuits and with manual or automatic reset. Write to the Pierce Governor Company, Inc., Anderson, Indiana, for Bulletin 404.

ITS NEW

**The World's Leading Manufacturers of
FUEL INJECTION EQUIPMENT
for Diesel Engines**



Depots and
Service Agents
in over 100 Countries

FUEL INJECTION EQUIPMENT DIVISION

of

LUCAS ELECTRICAL SERVICES, INC.

Head Office: 501 West 42nd Street, New York 36, New York

Sales Office: 14820 Detroit Avenue, Cleveland 7, Ohio

West Coast: 5025-29 W. Jefferson Blvd., Los Angeles 16, California

Branch Offices: 643 7th Street, San Francisco, California

4937 West Belmont Avenue, Chicago, Illinois

Canadian Distributors:

Joseph Lucas (Canada) Ltd., Head Office: 11 Davies Avenue, Toronto 8, Ontario

Branch Office: 3401 St. Antoine Street, Montreal 30, Que.

AP.174-819

Management Appointments At HMS



James J. Ford



Fritz Maier

James A. Taylor, President of Hartford Machine Screw Company, Division of Standard Screw Company, has announced the appointment of James J. Ford as General Manager and Fritz Maier as Sales Manager of the rapidly expanding Fuel Injection Division. Mr. Ford joined Hartford Machine Screw Company in 1946 and has been serving as Sales Manager of the Fuel Injection Division for the Roosa Master fuel injection pump, the new fuel filter and allied products for the diesel engine industry. Prior to joining this company, he attended Hotchkiss School and Williams College and served from 1941-1946 in the Army of the U.S. He was separated as a Major from the Amphibious Forces of the Corps of Engineers. Fritz Maier came to Hartford Machine Screw Company in April from American Bosch, Division of American Bosch Arma Corporation, Springfield, Massachusetts. He joined this company in 1934 and served in many capacities including Manager of Order and Contract Department, Staff Assistant to the Executive Vice President, Market Analyst and Manager of Sales Office. In the Fuel Injection Division, Mr. Taylor also announced the appointment of Frederick R. Hill as Assistant Sales Manager, James N. Britton as Service Manager and Pasquale Demase as Assistant Factory Manager in charge of the division's product production.

Truck Converted To Diesel



More reserve power for hauling up long grades is showing up in the performance of this heavy duty highway rig recently converted from gas to diesel by Moorman, DeWitt and Singleton, general contractors of Ft. Worth, Texas. The converted twin tandem-axled unit, used on grueling construction equipment hauls in regions around Dallas and Ft. Worth, is recording trip times that indicate an average road speed of 45 mph. The replacement engine is a 6-71 General Motors Diesel with a standard three speed transmission and fifth-gear overdrive. The conversion job was performed within the contractors' own servicing shop at low cost requiring only minor modifications to the truck.



Jim Miller, Shepherd Machinery Co.'s General Service Manager, administrates one of the country's largest and most modern heavy equipment repair facilities.

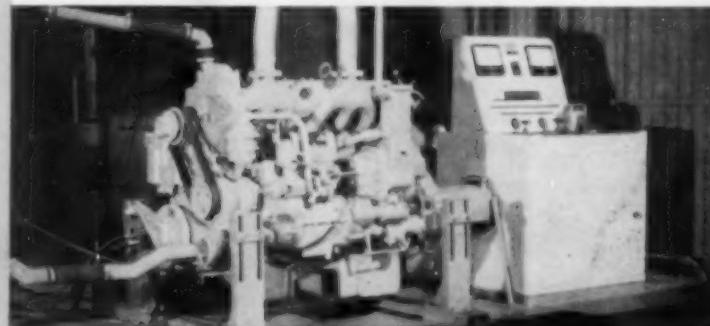
SHEPHERD MACHINERY SAYS:
"With our Clayton Dynamometer
we deliver better engine performance...
happier customer service—
at greater profit!"

Keeping customers happy and coming back to the same place to do business is essential to Jim Miller, General Service Manager of the Shepherd Machinery Company, located in Los Angeles... one of the nation's largest dealers in construction machinery, industrial and marine engines.

"With our Clayton Engine Dynamometer—which we purchased in June 1953—we are certain that we're making available to our customers the highest possible standards of service, and at a profit to us.

"A Dynamometer offers many advantages," states Jim Miller, "but most important to us has been the ability to run-in and accurately test all rebuilt engines... This has practically eliminated costly warranty field service trips and, of course, vastly improved customer confidence in our workmanship... This alone means thousands of dollars a year to any engine distributor."

Let a Clayton representative show you how a Clayton Dynamometer will pay for itself out of savings alone.



FEATURES OF CLAYTON DYNAMOMETERS

- Designed and built for "running-in" rebuilt gasoline and diesel engines.
- Gives complete on the road or job performance data in terms of horsepower or torque and RPM.
- Torque loads are maintained indefinitely or changed at will to fully test any engine.
- Engine adjustments on the stand are simple to make.
- All models handle either right or left hand rotation.

Sirs: Please send us more information on the complete line of Clayton Dynamometers without any obligation to us.

NAME _____ COMPANY _____

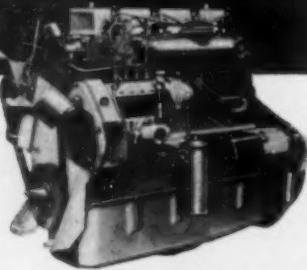
ADDRESS _____ CITY _____ STATE _____

OUR BUSINESS IS _____ We handle _____ engine repair jobs a week.

Send to: **Clayton MANUFACTURING COMPANY**
NORTH TEMPLE CITY BLVD., EL MONTE, CALIFORNIA

PERKINS...

can help you
sell more
equipment on
a world-wide
scale!



450,000 Perkins diesel engines
are now in use in 163 countries of
the world—in 423 applications.

F. Perkins Ltd. have sales, service and parts outlets in 106 countries. Versatile Perkins engines are available to the specifications of your engineering department, anywhere in the world.

This means you can have your equipment shipped anywhere in the world—without motors—at less cost to you and your distributor. Your customer can then readily install a Perkins diesel package, tailored to your application and approved by your engineering department, at destination point. This would also reduce the dollar cost of the equipment, important to customers in the non dollar area.

Perkins maintain an engineering staff in Toronto, Canada. Phone them—they will fly down and discuss applications with you. Prototype installations can be made at Toronto or at your plant.

Cut shipping costs and assembly problems... call or write Perkins' Toronto office.

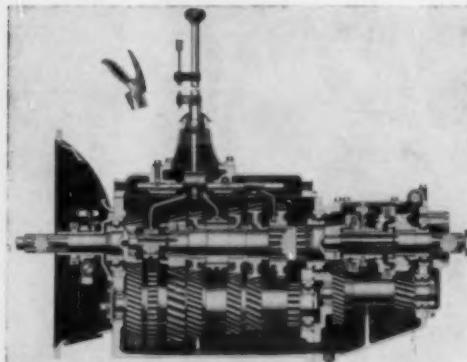


Travelling Engine Display



A show trailer unit featuring the latest diesel developments of the P&H Diesel Division of Harnischfeger Corporation, has been plying the highways of the U. S. recently. This unique engine display features various Harnischfeger two cycle engine models for automotive, marine, generator set and industrial applications. The trailer is pulled by a Hendrickson tractor, which is also equipped with a P&H diesel. The trailer has a two cylinder P&H diesel generator set installed. The engine drives a 30 kw 60 cycle Electric Machinery generator at 1200 rpm. This set supplies the complete power requirements of the trailer and weighs about 2450 lbs. Also on display in the trailer are a six cylinder automotive type diesel, a three cylinder marine type engine, and a four cylinder automotive diesel.

New Truck Transmission



Two new semi-automatic Fuller RoadRanger Transmissions for engines up to 630 cu in. of displacement and rated up to 185 hp have been announced by Fuller Manufacturing Company, Kalamazoo, Michigan. The two new models are the R-63 and R-630-D for diesel ratios. Both feature 10 forward and two reverse speeds, with all ratios selected by one gear shift lever. The R-63 RoadRanger is a direct-in-tenth transmission and the R-630-D RoadRanger is a direct-in-ninth transmission with overdrive in tenth gear. Other features of the two new Fuller RoadRanger Transmissions are: Easier, quicker shifts averaging 29 per cent between ratios; elimination of gear splitting through selective gear ratios that are evenly and progressively spaced; closely spaced steps permit engines to operate in the maximum horsepower range, for greater fuel economy; less driver fatigue since shifting effort is substantially reduced; compact space-and-weight saving economies; range shifts are pre-selected, automatic and synchronized. For further information on the new R-63 and R-630-D RoadRangers, or details on the complete

SPECIFICATIONS

GEAR RATIOS	R.	Step	R-630-D	Step
Tenth	1.00	27	.78	28
Ninth	1.27	28	1.00	27
Eighth	1.44	28	1.27	28
Seventh	2.10	29	1.64	28
Sixth	2.73	29	2.10	28

RANGE SHIFT

33 35

Fifth	0.63	27	2.83	26
Fourth	4.61	27	3.63	27
Third	5.85	28	4.61	28
Second	7.62	28	5.36	28
First	9.56	29	7.63	28

Low Reverse 11.54 11.50 Low Range

High Reverse 3.18 3.18 High Range

Weight 657 lbs.

Oil Capacity 38 pts.

PTO Openings SAE No. 1, Part No. 12200, for Lipe-Railway two-plate push type clutch.

R-63 and R-630-D—Large 6-Bolt, SAE Shim Length—Both N. R. and L. H.

PTO Gear SAE No. 1, Part No. 11100, for Spicer two-plate push type clutch.

R-63 and R-630-D—47 tooth gear on countershaft turning 228 engine speed.

Installation Dimension 37-11/32"

Speedometer Drive—Rear bearing cover maintained for installation of speedometer gear and attachment of cable.

Brake Support—Three $\frac{1}{2}$ " stud with nuts and lockwashers furnished in rear of case for attachment of flexible rear support. Parking brake must be augmented frontwise support.

Clutch Housing SAE No. 1, Part No. 11300, for Lipe-Railway single-plate clutch.

SAE No. 2, Part No. 8387 Spicer two-plate pull type clutch, 12" and 14".

Lipe-Railway two-plate push type clutch, 14" only.

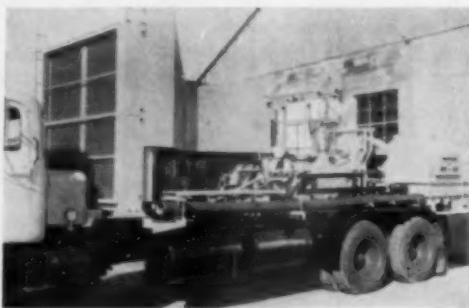
SAE No. 1, Part No. 11200, for Lipe-Railway two-plate push type clutch.

Clutch Release Mechanism—Furnished for Lipe-Railway and similar push type clutches. Not furnished for Spicer-Lipe and similar pull type clutches. Order from manufacturer.

ITS NEW

line of Fuller Transmissions, write to Fuller Manufacturing Company, Kalamazoo, Michigan.

Oil Well Fracturing Unit

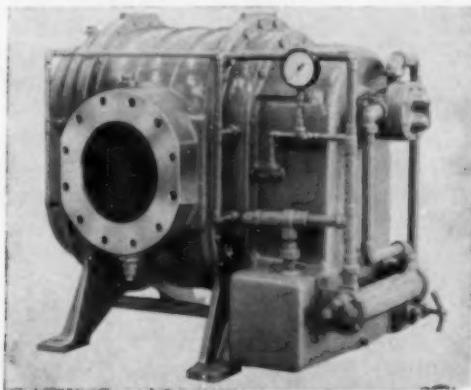


The new Fracmaster Model 600-C oil well service units of Western Company utilize two Cummins diesels to provide an interesting distribution of power. The units are built on an International RDF-230 truck powered with a Cummins HRFB engine. However, this road engine can be employed to power the deck engine fan, the circulating water pump for the heat exchangers, and the winch drive. This releases the full power of the deck engine for the pump. The pump is driven by a Cummins VT-12-1 Turbodiesel engine, rated 600 hp at 2100 rpm. The Fracmaster 600-C Fracturing unit has a Western Company RB-80 triplex pump, Clark torque converter, and Cotta 1002 transmission. These ingenious units were engineered by Al Albright, Chief Engineer for Western Company, and his staff. The unit pictured here is one of six assembled for Western Company at Helm Manufacturing Co., Fort Worth. The engines were supplied by Cummins Sales and Service, Inc. of Fort Worth.

New Blower Design

A completely new blower, utilizing the basic and well-known Roots rotary positive principle, has been developed by Roots-Connerville Blower, Division of Dresser Industries, Inc. which introduces design and operating advantages for more efficient handling of air and gas. The new blower features

a vertical arrangement of the impellers providing horizontal inlet and discharge connections for more convenient piping. The drive shaft extends from the lower impeller to match more closely motor shaft heights. An improved segmented waist impeller shape permits safe handling of entrained liquids with an additional advantage of more quiet operation. A thoroughly tested and proved flanged stub shaft design permits a higher pressure rating for a given impeller length to deliver greater displacement without extremely high rotating speeds. This compact design reduces overall dimensions to a minimum. External bearings and separate oil reservoir are eliminated to further reduce the space requirements of the unit. Delivery of completely oil free air or gas is assured by double seals on the shafts—a multiple labyrinth seal plus a positive oil seal.



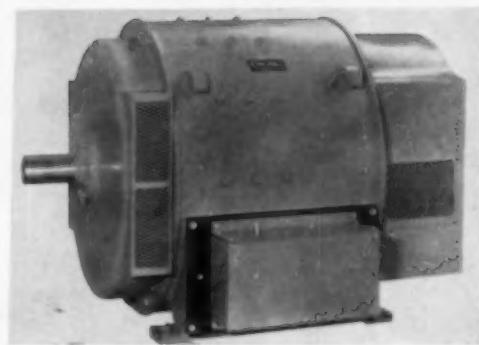
All units are sized for direct connection to low

cost moderate and high speed motors. V-belt drives may also be used for intermediate ratings up to approximately 200 hp. Speeds are well matched to economical gas or diesel engine speeds, while steam turbine drives can be used with standard speed reducers. Both blowers, designated Type RAS, and gas pumps, designated Type RGS, have identical volume and pressure ratings. 36 carefully selected sizes are offered to cover a capacity range of from 2,000 to 14,000 cfm at 6 psig and from 1,500 to 8,000 cfm at 10 psig. All parts of the blowers and gas pumps are identical with the exception of the gas pump bearing carrier and seal. This standardization not only results in good performance but simplifies maintenance and parts replacement as well. The one-piece cylinder assures maximum rigidity and avoids difficult joints, resulting in a gas-tight machine. The standard unit is constructed of high grade cast iron. However, it is readily adaptable to other materials including aluminum, bronze and stainless steel when weight or corrosion are important considerations. For specifications and complete technical information, write for Bulletin RAS-158 to Roots-Connersville Blower, 900 W. Mount Street, Connersville, Indiana.

ITS NEW

Larger DC Generators

With the addition of its new Series 4230 dc Frame, Columbia Electric Mfg. Co., 4519 Hamilton Ave., Cleveland 14, Ohio is now in a position to supply dc Generators in ratings through 300 kw, 1200 rpm, either as two wire 250 volt, three wire 125/



250 volt, or 600 volt. The new Frame 4230 Series of Columbia dc Generators are of bracket ball bearing design and feature all steel fabricated construction. Machines are available as single or two bearing units, shunt or compound wound as required. Other design features of the Frame 4230 include split brushes, through ventilation, rugged fabricated steel rocker arm, readily accessible brushes and brushholders, dynamically balanced armatures, laminated commuting pole pieces and silicon killed steel frame. Units are available for diesel engine drive or can be furnished as complete induction or synchronous motor generator sets. The manufacturer states that these generators meet all standards of NEMA and ASA-C50. They are also available as marine generators to meet either ABS, Coast Guard, AIEE-45 or Lloyd's requirements. Columbia also manufactures ac Generators up through 1000 kva, in addition to standard voltage and low voltage motor generator sets.

ITS NEW

Channelcromium

The HEAVY DUTY chrome plating for diesel cylinder liners in railroad, pipeline, stationary and marine applications.

Write us or call to find out how we can improve lube oil consumption and lengthen engine life. The tougher the job, the better we like it.

PENNINGTON CHANNELCROMIUM COMPANY

319 Dakota St., San Antonio 3, Texas
Phone: CApital 6-8421

LET US TAKE YOUR NOISE AND PULSATION PROBLEMS OFF YOUR HANDS

It is our engineering specialty to

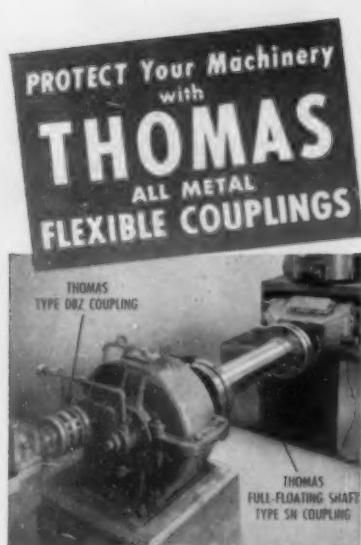
STOP PULSATION
—from surges created by compressors, pumps, blowers and pressure reduction systems.

STOP NOISE
—from intake or discharge of air, steam or gas from engines, compressors and vacuum systems.

The Burgess-Manning Snubbing Principle, engineered to your specific problems, will provide noteworthy savings in operating and installation costs, increased production, reduced maintenance, improved public and employee relations and prevention of compensation claims.

We invite you to present your problems for recommendations.

BURGESS-MANNING COMPANY
Sound Engineering
9211 Sovereign Row, Dallas 33, Texas
Libertyville, Illinois



**NO LUBRICATION
NO MAINTENANCE
NO WEARING PARTS**

Future maintenance costs and shutdowns are eliminated when you install Thomas Flexible Couplings. These all-metal couplings are open for inspection while running. They will protect your equipment and extend the life of your machines. Properly installed and operated within rated conditions, Thomas Flexible Couplings should last a lifetime.

UNDER LOAD and MISALIGNMENT ONLY THOMAS FLEXIBLE COUPLINGS OFFER ALL THESE ADVANTAGES.

- 1 Freedom from Backlash Torsional Rigidity
- 2 Free End Float
- 3 Smooth Continuous Drive with Constant Rotational Velocity
- 4 Visual Inspection While in Operation
- 5 Original Balance for Life
- 6 No Lubrication
- 7 No Wearing Parts
- 8 No Maintenance

INDUSTRIAL COUPLINGS
Compressor Drives
Pump Drives

DIESEL ENGINE COUPLINGS
Main Drives
Auxiliary Drives

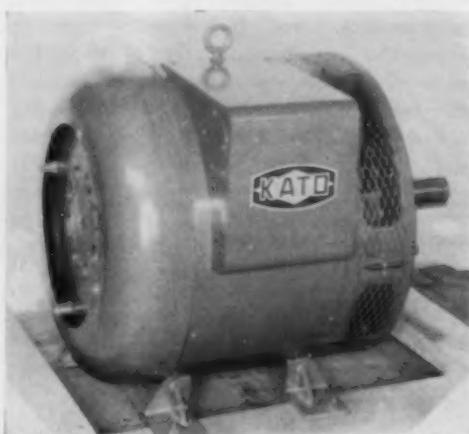
MARINE COUPLINGS
Main Drives
Auxiliary Drives

Write for Engineering Catalog

THOMAS FLEXIBLE COUPLING CO.
WARREN, PENNSYLVANIA, U.S.A.

Brushless AC Generators

A complete line of 50, 60, and 400 cycle brushless alternating current generators has been developed by Kato Engineering Company, Mankato, Minnesota. These machines are available in both single and three phase output with all standard commercial voltages available throughout the range of sizes offered in brush type alternators. The 60 cycle, three phase sizes extend from 5 to 400 kw and 400 cycle from 1 to 250 kw, revolving field types in all standard commercial voltages through 600 volts. Some sizes are available in the higher voltages of 2300 or 4160 volts. Developmental work began in 1951 with several models being manufactured for various applications since that time. Several models have been thoroughly tested at inland and gulf oil drilling fields and at other hazardous operating environments.

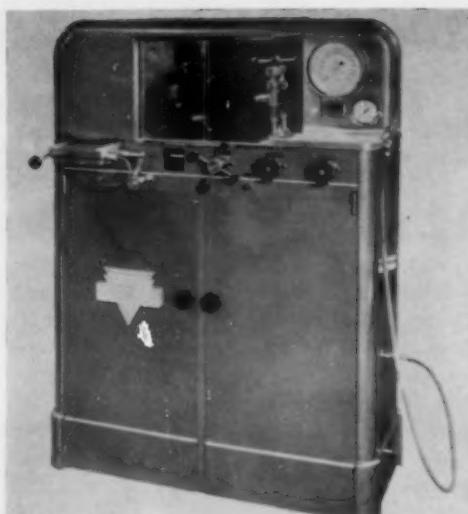


These brushless, "Spark Free" generators are available in single bearing and two bearing close coupled design for direct connection to industrial engines and can be supplied in standard two bearing design for belt drive applications. There is no possibility of sparks with these brushless alternators as all spark producing components have been eliminated and replaced with a system of rectifiers which change a portion of the ac output to direct current. This dc is fed to the field poles of the exciter. The ac output of the revolving armature type exciter is in turn fed to a rectifier assembly and changed to dc which is fed to the revolving field poles of the alternator. In addition to increased safety factor and elimination of brush and brush ring maintenance, the size and the weight of the machines are less compared to the conventional type alternator.

ITS NEW

Injector Nozzle Tester

Leslie Hartridge, Ltd., of England, has introduced an improved injector nozzle tester. Known as the Hartridge Universal Diesel Nozzle Analyser, it permits not only accurate testing of a nozzle during any part of the injection period, but also allows observation of the action of the needle throughout the period that it actually lifts and returns to the body seat. It also provides a means of ascertaining the oscillation of the needle at varying rates of flow and the degree of atomization at any part of the injection. With the new Hartridge analyser, the injector is tested by the application of a continuous flow of high pressure oil to the nozzle, with the ability to vary the rate of flow from nil to full demand and to maintain



any desired rate of flow for an indefinite period of time. Precise observation of the action of the nozzle by slow motion is therefore possible. Other features of the improved nozzle analyser include a quick action injector holder, illuminated spray cabinet, combination time and pressure gauge, and centrally located controls. Technical information and prices are available from Diesel Injection Sales & Service, Inc., 808 Union Street, Norfolk, Virginia, the exclusive Hartridge distributor in the United States.

ITS NEW

Compact Heat Exchanger



A line of small rotary, air-to-air heat exchangers which can take waste gases at temperatures as high as 1000°F. has been developed by The Air Preheater Corporation, 60 East 42nd St., New York, N.Y. About 20 in. in diameter and 11 in. in overall depth, the new compact rotary regenerative heat exchanger can handle flows of 250 cfm. Larger units up to 4 ft in diameter can handle flows as high as 2600 cfm. Efficiencies of 90 percent or more can be realized, according to Air Preheater engineers. Arrangement of multiple units in parallel with common ducting will accommodate flow rates greater than 2600 cfm. Chief component of the rotary regenerative heat exchanger is the rotor with individual sector shaped baskets that contain the heating element. Seals and sealing surfaces remain plane and parallel to minimize leakage despite severe axial temperature gradient in the heating elements during operation. Drive for the rotary regenerator is a 1/4 hp gearhead motor.

ITS NEW

Lightweight Truck Diesel Brochure

A newly-developed lightweight GM diesel engine for trucks in the 210 hp range is described in a 4-page illustrated brochure released by the Detroit Diesel Engine Division of General Motors. Described are the design features of the new six cylinder 71-E engine which is trimmed to 8.4 lbs per hp through the liberal use of aluminum alloys in the cylinder block and other major components. The brochure includes also comparisons of performance and economy of the new GM model with competitive diesels of comparable horsepower based on factory ratings. Copies of the brochure may be obtained from Detroit Diesel distributors and dealers or by writing Detroit Diesel Engine Division, General Motors Corporation, Detroit 28, Michigan.

Hercules Acquires Hall-Scott Engine Division

Hercules Inc. and Hercules Motors Corporation have jointly announced the purchase by Hercules of the Hall-Scott Engine Division of Berkeley, Calif. This action has been approved by the Board of Directors of both firms. W. L. Pringle, president of Hercules, advised that the consideration was cash and notes but did not disclose the amount. The purchase includes all inventory, certain machinery, tools and engineering data along with the use of the Hall-Scott name. Hercules plans to build Hall-Scott engines in their present plant facilities at Canton, Ohio, and will continue to produce Hall-Scott engines as well as to provide service for units in the field through their world-wide distribution facilities. This will complement Hercules' present line of liquid and air-cooled gasoline and diesel engines and will make available a horsepower range of from 5 hp to 600 hp. Mr. Pringle advises that the Hall-Scott engines will be available as quickly as it is possible to move the necessary machinery and inventory from Berkeley, Calif. to Canton, Ohio. Hall-Scott service parts will continue to be available and will be handled through Hercules and Hall-Scott distributors and branches. Hall-Scott manufactures a line of engines ranging from 250 to 600 hp in six and twelve cylinder construction. Known for their good performance characteristics, the engines are used in trucks, buses and specialized vehicles such as fire trucks. They also have numerous off-the-road applications.

Industrial Sales Manager

The appointment of John C. Hammeleff as Industrial Sales Manager for Mercedes-Benz diesel engines has been announced by W. A. Martin, Director

of Sales, Utica Division of Curtiss-Wright Corporation. In his new position he will direct Mercedes-Benz diesel sales for all industrial applications. Mr. Hammeleff joins Curtiss-Wright's Utica Division after 25 years with the Chrysler Corporation's Industrial Engine Division as Director of the Marine and Industrial Engine Division, and as Sales Manager Industrial Engine Div.

Floating Shaft Coupling

To meet industry's requirements for small, high and low speed couplings, the Thomas Flexible Coupling Company has brought out a floating shaft type coupling in miniature sizes. The floating shaft is held concentric by Thomas Flexible disc rings at both ends. The extended distance between disc rings permits more misalignment capacity than when disc rings are close together. Shafts may be either solid or tubular. This type of coupling can be used with semi-floating type couplings to make long power transmission shafts with a minimum of bearings. The elimination of as many bearings as possible makes for better power transmission and fewer likely sources of trouble. It also provides a method of clearing obstructions when two drives are close together, —one can be coupled with the standard length coupling and the other with a floating shaft coupling which will stagger the driving units and save space.

The semi-floating shaft would be the same as the above but with a single-flexing coupling on one end only; the other end would be supported by an outboard bearing. The Thomas semi-floating shaft type of flexible coupling fulfills a very definite need in industry for breaking up the bending moment caused by misalignment in spans of three or more bearings and does it without bringing into the situation any adverse features. In fact, it does away with parallel misalignment which is so difficult to take care of. It functions similar to a rotary hinge. The principle of the Thomas Flexible Coupling is such that it drives like a solid coupling but has flexibility to take care of misalignment and end float. The Thomas Coupling will support weight while transmitting torque and at the same time provide flexibility without the use of pilot bearings.

ITS NEW

HERE IS IMPORTANT INFORMATION! The completely new 1958 edition of the DIESEL ENGINE CATALOG, Volume 23, is now available. If you design, purchase, sell, operate or service diesel, dual fuel or gas engines, the Catalog is essential to you. This giant, 400 page, 10½" x 13½", fully illustrated reference book has been revised, rewritten and brought up to date completely from cover to cover. Send your order in now for this limited edition, which costs \$10 postpaid plus California sales tax where applicable. Send checks or company orders to DIESEL ENGINE CATALOG, 816 N. La Cienega Blvd., Los Angeles 46, Calif.

SILENCERS AND SPARK ARRESTORS SHIPPED WITHIN 4 days

AFTER RECEIPT OF ORDER

Standard or special models.
All sizes and types for every
industrial, mobile and marine
use, intake or exhaust.
Write for helpful 24-page
catalog on choosing silencers
and spark arrestors.



15 years
experience
in silence,
exclusively!

Kittell

Kittell Muffler & Engineering, Inc.
1977 BLAKE AVENUE • LOS ANGELES 39, CALIFORNIA

The distribution of pockets that retain the lubricating oil on the bearing surfaces of Mecrome liners is as uniform as the rifling of bullets fired from the same gun! This means "break in" periods are rapid. The bearing surface has no large solid unetched areas that cause friction where the liners contact the rings. This even distribution of pockets also results in long liner life as there are no large soft spots that wear out prematurely. Keep diesels in service longer. Send us a trial order today.

MECROME LINER POROSITY as uniform as the rifling of bullets from the same gun!



Write for the mecrome catalog

A complete description of the many advantages obtained by this exclusive plating process.



MECROME®

FIGHTS FRICTION TO THE FINISH®

METAL FINISHERS, INC.

1725 E. 27th ST. • CLEVELAND 14, OHIO • TEL.: MAin 1-8511

3135 BRINKERHOFF ROAD • KANSAS CITY, KANSAS

IN CANADA: NATIONAL HARD CHROME PLATING CO. LTD., TORONTO, ONT.

SAVE MONEY with **Interstate**

diesel service incorporated
2093 East 19th St., Cleveland 15, Ohio

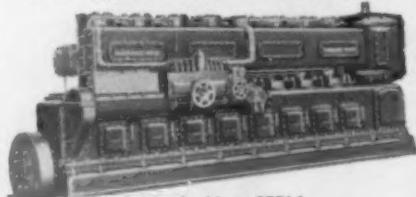
America's largest GM fuel injector rebuilder

FOR SALE

Fairbanks-Morse Diesel Engine with Skinner oil Purifier and equipment. 6 Cyl., 360 H.P., 257 RPM, Style VA

The Galena Shale Tile & Brick Company
Galena, Ohio

NEW • UNUSED CURRENT MODEL MARINE PROPULSION ENGINE



Fairbanks-Morse 37F16
7 cyl. — 1400 HP — 300 RPM
Direct reversible • Top ABS-Rating
Priced To Move

DIESEL DIVISION

National Metal & Steel Corp.
TERMINAL ISLAND (Los Angeles Harbor), CALIF.
PHONE: NEvada 6-9871

WATER-LARM warns you when engine water is low...



Water-larm . . . the new warning system that tells you when water is low . . . before the engine gets hot. It gives positive warning under 100% of all situations.

Fully Guaranteed... Built for a Lifetime of Protection by

**WATER-LARM
CORPORATION**

404 S. E. 202nd

PORLAND 16, OREGON

Assistant Sales Manager



Frank L. Friedli

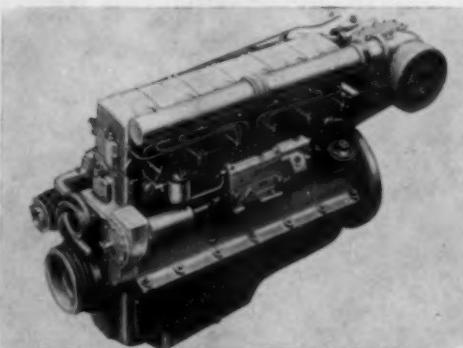
The elevation of Frank L. Friedli to the position of Assistant Sales Manager, Special Projects, has been announced by Grant C. Woodard, General Sales Manager of The Cooper-Bessemer Corporation, Mount Vernon, Ohio. In his new capacity, Mr. Friedli will be directly re-

sponsible for the sales of automatic controls to the oil, gas, chemical and power industries, Mr. Woodard points out. The appointment of Mr. Friedli is another step in the development of the new Electronic-Controls Division recently set up by Cooper-Bessemer. This division is devoted entirely to the development of controls for the automation of engines and compressor equipment on pipe lines, in petrochemical processing plants, in municipal and industrial power generating plants.

Two New Diesels Available

The Utica Division of the Curtiss-Wright Corporation announces that the MB 846Ab Mercedes-Benz diesel engine is now available in the United States. This model provides reliable, turbocharged power in the 175 to 320 hp range. It is a six cylinder, four cycle, vertical in line, liquid cooled engine with a compression ratio of 17 to 1. The MB 846Ab weighs 4298 lbs with over-all dimensions of 83 in. long, 35 in. wide and 58 in. high. Combustion system is the proven Daimler-Benz pre-combustion chamber type and utilizes Robert Bosch injection pumps and nozzles. Glow plugs are provided to give fast, sure starts without additional aids under adverse climatic conditions. High quality engineering is apparent in such features as the aluminum alloy oil pan which incorporates a provision for heating the oil, the oil pre-pumping system assuring oil pressure before the engine starts. The MB 846Ab is available in either heat exchanger or radiator cooled models for boats, marine auxiliaries, pumps, generators, drilling rigs,

Mercedes Benz Model MB 846Ab
turbocharged diesel.



Grinding and Hard-Chrome Plating of Diesel Engine Crankshafts—Railroad Sizes Down

A pioneer in hard chromium plating in this country.
A pioneer in chromium plating diesel crankshafts.

LANE PLATING WORKS



Experience • Quality • Precision
5322 Bonnie View Road • P.O. Box 9115
Phone FRanklin 1-1351 • DALLAS, TEXAS

heavy-duty trucks, construction, mining and logging machinery plus many other applications.

The Curtiss-Wright Corporation also announces that the MB 846A Mercedes-Benz diesel engine is now available in the United States through its Utica Division. This engine is produced in the 130 to 240 hp class. It is a six cylinder, vertical in line, four cycle, liquid cooled engine. Combustion system is Daimler-Benz pre-combustion chamber type and utilizes efficient Robert Bosch injection pumps and nozzles. Glow plugs to aid starting in low temperature weather are standard equipment. The MB 846A weighs 4075 lbs. with over-all dimensions of 91 in. long, 59 in. high and 32 in. wide. Included in the many features are: a seven bearing, heat treated camshaft, a rugged, finely balanced, seven main bearing crankshaft, six special alloy cast iron cylinder heads and an oil priming pump which lubricates the engine before starting. Applications for the MB 846A include ships, marine auxiliaries, generator sets, drilling rigs, heavy-duty trucks, construction, mining and logging machinery, plus many others. It is available in either heat exchanger or radiator cooled models. For additional information on both of these engines, contact Curtiss-Wright Corporation, Utica Division, Utica, Michigan.

ITS NEW

Sales Promotions At De Laval



C. E. Cromwell

Four changes in the sales organization staff of the De Laval Steam Turbine Company, Trenton, N. J., have been announced by H. G. Bauer, executive vice president. C. E. Cromwell has been appointed Manager of Commercial Sales, with responsibility for sales activities of commercial products including pumps, centrifugal compressors, turbines, and commercial gears. In addition to his new position, Mr. Cromwell will continue as Field Sales Manager. Mr. Cromwell, who has been with De Laval for 21 years, was Detroit District Manager from 1946 to 1957. He is a graduate of Rose Polytechnic Institute. A. L. Foltz, Jr., Manager of the Detroit District Office since 1953, has been appointed Manager of the Chicago District Office. He is a graduate of Purdue University. J. F. Donovan, a De Laval sales engineer for the past nine years, with tours of duty in the Detroit and Kansas City Offices, has been appointed Manager of the Detroit District Office. He is a graduate of the University of Pittsburgh. The appointment of W. H. Mouquin, former Manager of the Chicago District Office for the past two and a half years, as Manager of the newly established New York District Office has also been announced.

AVAILABLE NOW!

1958 Diesel Engine Catalog

New complete
information on
engines and
accessories

look at the contents

- 1 ENGINES—All major manufacturers of diesel, dual fuel and gas engines are represented in multiple page sections. Text is supplemented with specifications, power curves, photographs and sectional views.
- 2 TURBOCHARGERS and SUPERCHARGERS—This section of manufacturers is detailed and fully illustrated to give complete information on this increasingly important phase of the industry.
- 3 TRANSMISSIONS—The latest information on torque converters, fluid drives, and other modern means of transmitting power are fully described and illustrated in this section.
- 4 ACCESSORY EQUIPMENT—Recent developments in fuel injection systems, governors, and other key accessory units are detailed and illustrated fully in this section.
- 5 MARKET PLACE—A convenient, time-saving listing of sources from which you can obtain the multitude of items and services needed by the fast growing Diesel Industry.
- 6 ADVERTISING—Leading manufacturers of engines, accessories, and services bring out the important features of their products in attractive, easy to read advertisements to further enhance the reference value of the CATALOG.

VOLUME 23 of the DIESEL ENGINE CATALOG is now available and is the biggest, most complete edition published to date. It has been completely revised and rewritten with many new or extensively changed sections graphically describing new engines and accessories. If you design, purchase, sell, operate or service diesel, dual fuel or gas engines, this new Catalog is a practical necessity. Recognized as the "Bible of the Industry," the 1958 DIESEL ENGINE CATALOG is a big 400-page book. With the same size and wide-open format as in previous editions, reference is simple and quick. Each section is fully illustrated with pictures, power curves, specification charts and sectional views. Equally important, the text presents a full description of the products and their fields of application.

READY TO MAIL NOW
order today!



This brand new edition of the 1958 DIESEL ENGINE CATALOG is now available.

Order your copy of VOLUME 23 NOW!
Still only \$10.00 per copy.

DIESEL ENGINE CATALOG

816 N. LaCienega Blvd.
Los Angeles 46, Calif.

Enter our order for _____ copy(s) of Volume 23, DIESEL ENGINE CATALOG.

Check is enclosed Bill us

\$10.00 per copy (plus state sales tax when delivered in California). When ordering from Sterling Areas, remit £4:0:0 to DIESEL PROGRESS, St. Paul's Corner, Ludgate Hill, London E.C.4.

Name _____ Position _____

Company _____

Business Classification _____

Address _____

City _____ Zone _____ State _____

Only ONE Torque
Wrench can be
accurately used
with...

**EXTENSIONS and
ADAPTERS**

It is mechanically impossible
to use any Torque Wrench
with adapters or extensions
(with accuracy) unless that
Torque Wrench has a positive,
built-in, fixed load position.

This essential factor of ac-
curacy, misunderstood or
ignored in the design and
manufacture of some tor-
que tools, can completely
defeat their purpose.

Patented
Pivoted handle
fixes load position



EATON VALVES

**Custom-Tailored
for Your
Diesel Engines**



**EATON
MANUFACTURING COMPANY**
VALVE DIVISION
9771 French Road, Detroit 13, Michigan

IS ACIDITY RUINING YOUR DIESELS?

MAYBE WE CAN HELP YOU.

PHONE, WIRE OR WRITE US.

INDUSTRIAL • FILTRATION SERVICE • AUTOMOTIVE
Ernest W. Dummer Co., Inc.
DEVELOPMENT — ENGINEERING — RESEARCH
6324 PENN AVE.
PITTSBURGH 6, PENNSYLVANIA
PHONE Hiland 1-4578

ADVERTISERS' INDEX

American Air Filter Co., Inc.	58	Maxim Silencer Co., The	60
Bendix Aviation Corp. Scintilla Division	11	Mercedes-Benz	9
Burgess-Manning Company	67	Metal Finishers, Inc.	69
C. A. V. Ltd.	64	Napier & Son, Ltd., D.	61
Clayton Manufacturing Company	65	National Metal & Steel Corp.	70
Cook Company, C. Lee	16	Nugent & Co., Inc., Wm. W.	12
Cooper-Bessemer Corp.	Fourth Cover	Pennington Channelcromium Co.	67
Curtiss-Wright Corp. Utica Division	5	Perkins (Canada) Ltd., F.	66
Dana Corporation	10	Purolator Products, Inc.	14
Detroit Diesel Engine Division, General Motors Corp.	54	Schwitzer Corporation	4
Dumler Co., Inc., Ernest W.	72	Scintilla Division, Bendix Aviation Corp.	11
Eaton Manufacturing Co.	72	Snow-Nabstedt Gear Corp.	62
Electric Machinery Mfg. Co.	63	Solar Aircraft Company	13
Fairbanks, Morse & Co.	52	Standard Oil Co. of California	17
Fuller Manufacturing Co.	19	Standard Oil Co. (Indiana)	8
Garrett Corporation, The (AiResearch Industrial Div.)	Third Cover	Stewart & Stevenson Services, Inc.	57
General Motors Corp. Detroit Diesel Engine Div.	54	Stratoflex, Inc.	51
Harrison Radiator Div.	2	Sturtevant Co., P. A.	72
Harrison Radiator Division, General Motors Corp.	2	Texas Co., The	Second Cover-1
Hartford Machine Screw Company	56	Thomas Flexible Coupling Co.	68
Illinois Testing Laboratories, Inc.	20	Twin Disc Clutch Co.	15
Interstate Diesel Service, Inc.	70	Utica Division, Curtiss-Wright Corp.	5
Kent-Moore Organization, Inc.	59	Water-larm Corporation	70
Kittell Muffler & Engineering Co.	69	White Diesel Engine Div., The White Motor Company	18
Koppers Company, Inc.	6-7	Winslow Engineering & Mfg. Co.	55
Lane Plating Works	70	Wix Corporation	53
		Young Radiator Company	63

NEW!



AIRESEARCH

CONTROL SYSTEM

SUPER-TURBOCHARGES

CATERPILLAR DW20 AND DW21 TRACTORS



New AiResearch Pressure Ratio Controls substantially increase lugger ability and travel speed of Caterpillar DW20 and DW21 Wheel Tractors equipped with AiResearch T-15 Turbochargers.

The new control unit more than doubles the torque rise, giving the tractor greater lugger ability when operating under heavy loads. Accurate control of turbocharger speed over a wide range allows the engine to operate effi-

ciently regardless of its changing load requirements.

This further improves other performance characteristics: decreases specific fuel consumption... improves acceleration... provides cooler engine operating temperatures... reduces smoking. The improved air induction system also provides equal rimpull for the new DW20 and DW21 at 10% higher travel speeds.

The two components of the new

AiResearch Pressure Ratio Control unit are a pressure ratio sensor and exhaust by-pass valve. They allow the turbocharger to operate at maximum boost pressure over a wide range of engine speeds and operating conditions, thus maintaining turbocharger speed, and hence engine air input, at higher levels while luggering. This improves the overall performance match of a free-floating turbocharger.

Your inquiries are invited.



CORPORATION

AiResearch Industrial Division

9225 South Aviation Blvd., Los Angeles 45, California

DESIGNERS AND MANUFACTURERS OF TURBOCHARGERS AND SPECIALIZED INDUSTRIAL PRODUCTS

after 9,700 hours
"engine in good condition . . .
maintenance costs remain low"

Owned and operated by Straits Towing Limited, Vancouver, the Cooper-Bessemer powered "Fury Straits" tackles towing, salvage and dredging operations ordinarily assigned to much larger vessels.

What the "Fury" lacks in size, however, is more than made up by the power and dependability of the supercharged 6-cylinder Cooper-Bessemer JS in the engine room. Working continuously in British Columbia, Puget Sound and Alaskan waters, this boat has already logged 9,700 hours of demanding duty.

In the words of Mr. John Orrange, Director of Purchasing and Maintenance for Straits Towing, "During our annual overhaul, we found the Cooper-Bessemer engine in good condition with maintenance costs remaining at a very low figure".

Find out for yourself—check with the men in your organization who know that there is a *real* difference in marine diesel performance. We believe you will find Cooper-Bessemer ranked as the quality leader in efficient, low cost operation.



Cooper/Bessemer

GENERAL OFFICES: MOUNT VERNON, OHIO
GENERAL: GAS-DIESEL - GAS-DIESEL
COMPRESSOR, RECONDENSING AND CHINCHOGAL,
ENGINE OR MOTOR DRIVEN

BRANCH OFFICES: New York City • Seattle, Wash. • Chicago, Ill.
Houston, Texas • Washington, D. C. • San Francisco and
Los Angeles, Calif. • St. Louis, Mo. • Gloucester, Mass. • New Orleans, La.
SUBSIDIARIES: COOPER-BESSEMER OF CANADA, LTD. . . .
Toronto • Halifax, Nova Scotia
COOPER-BESSEMER INTERNATIONAL CORPORATION . . .
New York • Caracas